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Diphtheria Prevention, Methods and Results*

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IT is proposed to discuss briefly those aspects of the problem of the specific prevention of diphtheria which are primarily of interest and concern to the general medical practitioner. The application of the principles and methods necessary to accomplish this will be explored. It is not intended, however, to consider the various ways in which public health organizations, central or local, may apply these in campaigns directed against diphtheria. Such methods will be based largely upon local conditions and considerations, the nature of which will vary from community to community and would, in the last analysis, involve the discussion of public health administrative procedures as well as the application of scientific methods of disease prevention.

It is not intended, either, to elaborate unduly fundamental considerations in infection and immunity which are the concern chiefly of the bacteriologist and immunologist. It is believed that the well-informed physician should be qualified to advise families in his charge as to how the occurrence of diphtheria may be eliminated from among them, and at the same time to have a satisfactory working knowledge and experience of methods which he may carry out among his own clientele.

To illustrate what was probably characteristic of communities everywhere in North America where diphtheria has been pandemic for many decades, it may be advantageous to review the position in a city where very considerable attention has been directed to the study of this problem, not only by the department of health of the municipality but also by the staff of the Connaught Laboratories and the School of Hygiene in the University of Toronto and a considerable number of physicians who have col-

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laborated both in campaigns of prevention and by carrying on immunization as private medical practitioners.

It has been pointed out recently by my colleagues, Dr. N. E. McKinnon and Dr. Mary Ross, that there existed, until recently, in the city of Toronto a state of affairs in which diphtheria morbidity and mortality were excessively high. There had been some reduction in the case-fatality rate, but for more than thirty years there had been little if any reduction in morbidity; that is, in the number of cases of the disease which were observed annually. In the year 1926, more than 1,000 cases of diphtheria were notified and there were 90 deaths reported as being due to the disease. This was a mortality rate of 16.2 per 100,000 of population. The following year (1927) there were 114 diphtheria deaths, a mortality rate of 20 per 100,000. In that year it was noted that diphtheria was the chief cause of death in the city of Toronto in the age-groups 2 to 14 years. Because of the fact that scattered individual efforts on the part of a few members of the medical profession had, to that time, made little impression upon the occurrence of cases of the disease, definite action was initiated by the Department of Public Health of that city, and campaigns of immunization were undertaken.

Before proceeding to the further analysis and presentation of the results which have followed many years of sustained effort, it may be well to devote some time to the consideration of the methods employed to determine immunity and susceptibility to diphtheria before or after vaccination (that is, active immunization) against the disease. In discussing these methods it may be recalled that, as a result of work done during the past twenty-five years, there is very general agreement that at the age of six months to one year the great majority of infants will be found to be susceptible to diphtheria. There is also general agreement that the percentage of susceptibles gradually falls, in any community where diphtheria is endemic, as the process of so-called sub-clinical infection induces immunity in a large number of persons in a diphtherial environment. The work of Dudley and others has made this clear. The precise nature of the mechanism by which this is brought about is not wholly understood.

THE SCHICK TEST

It may be desirable now to indicate that the Schick test for the ascertainment of immunity or susceptibility to diphtheria may, in individual instances, require to be carried out. Furthermore, its widespread use to determine the duration of active immunity will very frequently be required or requested. This is especially true where the family physician is responsible for the specific prevention of diphtheria among members of families in his practice. On the other hand, in those communities where the specific prevention of diphtheria is deemed to be the responsibility of the department of health, the Schick test may not be so widely used. In either case, however, it is self-evident that the materials employed in this test should be standardized and uniform regardless of their source. Unfortunately that is not always true, at the present time, in materials widely employed in the United States and Canada for the determination of immunity or susceptibility to diphtheria. My colleagues, Dr. P. J. Moloney and Dr. E. M. Taylor, have already directed attention to the desirability of employing standardized and stabilized toxin in this test, in an article published in the American Journal of Public Health in 1932.

More recently the subject has been further explored by Dr. Moloney and Dr. Taylor. Schick test toxins widely distributed in the United States and Canada prepared by fourteen different manufacturers of such materials were obtained and tested for combining-power and toxicity, utilizing as the standard preparation a Schick-test

toxin which had been prepared for the purpose, and standardized according to the regulation of the Therapeutic Substances Act of Great Britain (which conforms to standards adopted by the Health Organisation of the League of Nations). Of the fourteen specimens thus tested only six conformed to the regulation which provides that "one test dose mixed with 1/750 or more of a unit of antitoxin must cause no local reaction, but mixed with 1/1250 or less of a unit of antitoxin must cause a definite local reaction of the type known as the 'positive Schick reaction'." The level of diphtheria antitoxin in the blood which is revealed by the result of the Schick test depends solely upon the amount of antitoxin with which a given Schick dose of toxin can combine.

Since the Schick test is all important in informing the physician as to whether an individual is immune or susceptible to diphtheria, either before or after immunization, the use of Schick test toxin not carefully controlled and standardized can only lead to the utmost confusion and in many instances to the erroneous conclusion that protection actually obtains when it does not. This of course is a most unfortunate state of affairs, since it may occasion a false sense of security and lead persons who otherwise might seek protection for their children to assume that they already possess it. That is to say, that individuals who might require it, would not be vaccinated against diphtheria because of a fallacious Schick test resulting from the employment of unsuitable test toxins.

One other defect has been found in Schick test material from these various sources and it is this. Only three of fourteen fulfill the requirements in respect of toxicity. The remainder were too toxic. Thus it happens that all but one of the fourteen samples tested of preparations currently distributed both in the United States and Canada were found wanting in regard to both combining-power and toxicity requirements. The remedy for such a state of affairs of course is the more careful regulation and control of materials being distributed for use in the Schick test. Until this is required and complied with, conclusions and generalizations, either in the individual or in the group upon whom Schick tests have been done, even where there is no difficulty whatsoever of interpretation, may be invalid.

As is well known, a suitable control of Schick test results can readily be carried out where the necessary laboratory facilities are available for the estimation of antitoxin content by titration of human serum, in rabbits, by Fraser's modification of the original Römer method of antitoxin assay. Laboratories in which this may be done should be available in every state and province. It has been fairly well established by various workers that the presence of 1/250 of a unit of diphtheria antitoxin per cc. of blood serum is the minimum amount which will yield a negative Schick test and indicate that the individual probably possesses adequate protection against the ordinary exposure to diphtheria. After all, that is the question which will concern the physician and it is that question to which he presumably wishes to obtain a correct answer. He can do so only if Schick test materials which he employs are suitable and if they are subject to occasional control by the assay of antitoxin content in laboratory animals.

This aspect of the subject may then be summarized briefly as follows: The Schick test as a routine procedure need not be carried out in children between the ages of six months and six years under ordinary circumstances to ascertain whether a child is immune or susceptible. It is frequently desirable, however, to Schick test children at varying intervals after vaccination to determine whether the artificial immunity which has been conferred still persists. The value of the test in obtaining the answer to the question in

any given instance has not been fully realized. This is unfortunate because of the fact that it is well established that permanent protection will not be conferred upon all persons immunized with any diphtheria prophylactic, and it is also important to realize that the duration of protection may vary greatly in different individuals and may depend upon the immunizing agent used.

For these reasons if for no other, the Schick test is likely to have a place of continuing importance in the specific prevention of diphtheria. Antitoxin titration (Fraser-Wigham test) should be undertaken where the Schick test cannot be interpreted satisfactorily and in older persons and in those who are positive to the Moloney test, i.e., give a reaction to diluted diphtheria toxoid. (In other words, those who are sensitive to diphtheria bacillary protein.) Twenty per cent or more of such persons may also be susceptible to diphtheria and this is of very considerable significance. Formerly it was assumed that they were immune.

Immunity conferred by vaccination is the principal hope for effective control of the disease. The Schick test, the Moloney test, and the Fraser-Wigham test, are useful clinical and laboratory procedures which may aid in the prevention and control of diphtheria. The primary requisite, however, is a suitable antigen. We may then consider briefly the question of specific prophylactics or immunizing agents.

PREPARATIONS USED TO PRODUCE AN ACTIVE IMMUNITY

In the United States and Canada at the present time, those generally employed are three in number. Elsewhere, chiefly in the British Isles, a larger number of prophylactics have been utilized. As is well known, Behring in 1913 first introduced diphtheria toxin-antitoxin mixtures for vaccination against the disease. In the large-scale work undertaken in the United States by Park and his collaborators, this was the substance used. In the period 1916-1923 no other material was recommended; then Ramon proposed the use of modified diphtheria toxin, described by him as "anatoxine", more generally known on this continent as diphtheria toxoid or formol toxoid. It is essentially diphtheria toxin which has been deprived of its specific toxicity by formaldehyde and heat while still retaining its antigenic or immunizing properties. Since 1924 this has been very widely used in France and in many other countries.

In the Dominion of Canada sufficient diphtheria toxoid for the vaccination of more than one and one-quarter million persons has been prepared and distributed. It is everywhere admitted to be superior to toxin-antitoxin mixtures as an immunizing agent for human use. As a result of work done by Glenny and his colleagues in England in 1926, there has been recommended within the past two or three years another prophylactic, namely, alum-precipitated diphtheria toxoid. This has been proposed as a substitute for diphtheria toxoid. It has been introduced here possibly as the result of claims made on its behalf by workers, chiefly in Alabama and Virginia. In the first instance, it was asserted that a single dose of alum-precipitated diphtheria toxoid would protect as satisfactorily as would multiple (two or three) doses of toxoid or toxin-antitoxin mixture. This claim will be examined more in detail in a few moments. Despite the fact that alum-precipitated diphtheria toxoid was first prepared in England, it has not been widely used anywhere in the British Isles, with a few exceptions (Cork, Cardiff, Dublin, etc.), and practically not at all in the Dominion of Canada.

It has been claimed for alum-precipitated toxoid that its absorption proceeds more slowly and the antigenic stimulus can thus be applied over a longer period of time. In experimental animals it has been established that various non-spectific ad-

juvants, added to bacterial toxins, will enhance their antigenicity. In this there is no novelty. During the past thirty years various substances have been shown to act in this fashion. That such adjuvants do actually increase antitoxin response has been shown to be true, especially in the routine production of tetanus and diphtheria antitoxin in horses. That a single dose of alum-precipitated diphtheria toxoid will stimulate a greater antitoxin response than will a single dose of unmodified diphtheria toxoid in certain species of experimental animals, is indeed true, and work done in the Connaught Laboratories and elsewhere has indicated that perhaps the former (alum-precipitated toxoid) will give a twenty- to thirty-fold greater yield than will the latter (diphtheria toxoid). There are of course other considerations as well as the quality of the antitoxin response which must be considered in recommending a diphtheria prophylactic. Of these, two are of paramount importance: the duration of the response and the relative innocuity of the product. In an enquiry which had as its purpose the answer to this simple question: Which is the better antigen, one dose of alum-precipitated toxoid or three doses of ordinary diphtheria toxoid, my colleague, Dr. Donald Fraser, has recently obtained some interesting results which will be referred to in a moment.

Perhaps the chief advantage claimed for alum-precipitated toxoid by those who sponsored its use in the United States was that it immensely simplified the procedure of vaccination against diphtheria. Assuming that as a routine the Schick test is not necessary prior to its use, then it is claimed that one dose will bring about immunity in such a high percentage of persons injected with it that there will be an immense saving in effort and money. If this claim were valid, it would of course be of the highest importance. It may, however, be remarked parenthetically that if the conclusion has been arrived at, that diphtheria immunization is susceptible of application in a wholesale fashion by non-medical personnel and technicians, disregarding individual differences which may exist among those to be vaccinated, such a position is not only quite unwarranted, in my view, but may result in widespread criticism or even condemnation of specific efforts for the prevention of diphtheria.

Reverting now to Dr. Fraser's work, two groups of children, inmates of residential institutions, were selected, those in the first group consisting only of Schick-positive individuals who were Moloney-negative, that is, did respond to the intracutaneous injection of 1/10 of a cubic centimetre of diluted diphtheria toxoid (dilution 1-100). These were given one dose of 1 cc. of alum-precipitated toxoid containing 20 Lf's per cc. The Schick test results among the persons in this group were corroborated by antitoxin titration of blood drawn from each one of them before alum-precipitated toxoid was administered. Only those persons whose blood contained less than 1/500 of a unit of diphtheria antitoxin prior to vaccination were chosen. Ten weeks after the dose of alum-precipitated toxoid was given, blood was drawn, and again twelve to fourteen months later. The group was not a large one but it will be realized that such elaborate procedures carried out even in a limited number of persons involve a great deal of work. The group consisted of forty children. Antitoxin titrations were carried out at varying levels from 1/500 to 5 units per cc. of serum. After ten weeks, 38 per cent of the children had 1/100 of a unit or less of antitoxin, and 62 per cent more than 1/100; 70 per cent of them showed 1/50 of a unit or less, and only 30 per cent more than 1/50 of a unit. One year later, 81 per cent showed 1/100 of a unit or less, and only 19 per cent more than 1/100 of a unit; and still more surprising, 89 per cent had less than 1/50 of a unit and only 11 per cent more than 1/50 of a unit per cc. of serum.

In the group of children to whom three doses of diphtheria toxoid were given after blood had been drawn and the Moloney test done, only 9 per cent had 1/100 of a unit or less ten weeks later, whereas 91 per cent had more than 1/100 of a unit. Assays carried out at the 1/50 unit level gave identical results.

In a word, in the case of alum-precipitated toxoid, aften ten weeks only 30 per cent of persons had more than 1/50 of a unit, whereas in those given three doses of ordinary toxoid the corresponding figure was 91 per cent. After one year, in the case of thirty-two children of the three-dose group tested, 9 per cent had 1/100 of a unit or less, 91 per cent more than 1/100, and 69 per cent of the group still had more than 1/50 of a unit. While the two groups consist of relatively small numbers, there can be little doubt as to the significance and the importance of the results obtained. In the first place this is the only instance, as far as the writer is aware, in which a critical appraisal by suitable methods of the relative merits of alum-precipitated toxoid and unmodified diphtheria toxoid has been carried out. One additional precaution was observed, namely that the alum-precipitated and unmodified toxoid were prepared from the same original material. This eliminated another possible source of error. The control of the Schick test with antitoxin titrations was an additional precaution.

While it is not the purpose of Dr. Fraser and his collaborators to present these results as a justification for the adoption of any particular public health administrative procedure for the specific prevention of diphtheria, it can be claimed that under the conditions which obtained in their studies, unmodified toxoid in three doses at intervals of three weeks gave results vastly superior to those obtained by one dose of alum-precipitated toxoid, both in respect of the immunity response and in the duration of immunity.

These results of course are in harmony with the well recognized and quite fundamental principle in immunity that divided doses of an antigen administered at suitable intervals are likely to bring about a more durable and higher immunity response than will a single dose. It is known, too, as a result of the work of G. Dean (1899), Cole (1904) and Glenny (1923), that the response to a so-called secondary stimulus (that is, to the administration of a subsequent dose of antigen in human beings or animals to whom a first dose had been given weeks or months before) brings about a dramatic increase in antibody or antitoxin titre. For these reasons then, as well, it is clear that the *single dose method of administration* of alum-precipitated toxoid or any other prophylactic cannot, as yet, be said to be superior to, or as good as, other, perhaps less efficient or effective antigens, administered in divided doses at appropriate intervals.

At the present time, Ramon and others who have long been active in the field of diphtheria prevention, recommend the use of two doses only, of unmodified diphtheria toxoid or anatoxine of a high flocculating value. While it need not be considered in detail, the general statement may be made that two or three doses of such diphtheria toxoid containing 20 or more flocculating units per cc. will in more than 90 per cent of instances, bring about effective protection which will last for a considerable period.

In a recent study made by Dr. K. F. Brandon of the School of Hygiene, University of Toronto, in three groups of school children in Brantford, Ontario, all of whom had received three doses of toxoid at intervals of three weeks, the doses being ½ cc., ½ cc., and 1 cc. respectively, five, three or one year ago, the total number in the three groups being ninety-four, it was found that after five years 66 per cent of those tested were still immune, 34 per cent had become Schick-positive, that is, were again susceptible; in those

immunized three years previously, 92 per cent were still immune, 8 per cent had become susceptible; and in the group given three doses of toxoid one year previously, 97 per cent were still Schick-negative, and only 3 per cent Schick-positive. It should be said that these children had not been Schick tested after being given their third dose of toxoid originally. In this instance, Schick tests were read on the fifth day and not seen earlier. In a series of Schick tests done on the children in the city of Montreal after the injection of three doses of toxoid consisting of ½ cc., 1 cc., and 1½ cc. respectively at intervals of three weeks, 99 per cent of the children were found to be Schick-negative. It is to be observed, however, that these latter results were not comparable with those reported by Fraser, since antitoxin titrations were not carried out as well.

The present position then, with respect to a choice of diphtheria prophylactics, may perhaps be summarized as follows. First, diphtheria toxin-antitoxin mixture, the antigen originally used, is unsuitable for two reasons: primarily because it contains foreign serum which may give rise to serum sensitization; and secondly, because it is less satisfactory as an antigen, that is to say, it converts a smaller proportion of persons from Schick-positive to Schick-negative. Secondly, alum-precipitated toxoid, administered in a single dose, has been shown to be less effective than three doses of diphtheria toxoid. Reactions to toxoid may be avoided if the Moloney test is done on persons over the age of six years. We may conclude, then, that two doses (of 1 cc. each) or three doses (of ½, ½ and 1 cc.) of diphtheria toxoid of high flocculating value, administered at intervals of three weeks, is the best recommendation for the moment for the specific prevention of diphtheria.

RESULTS OBTAINED

Three essentials of a good antigen are innocuity, a high degree of immunizing value, and permanence of protection following its use. While not maintaining that the ideal procedure for diphtheria prevention has yet been developed, it may be emphasized that substantial progress has been made during the past eight years in following the course indicated.

In conclusion, some of the results in the city of Toronto which have been reported by McKinnon and Ross may be presented. In a recently published paper they have analysed the results obtained in 49,000 school children. A reduction of 91 per cent in diphtheria morbidity for the five-year period 1927-1932 has taken place. They have also demonstrated that an 85 to 90 per cent efficiency in protection is maintained for a period of four to five years at least.

During that period forty cases occurred in children to whom three doses of toxoid had been given, but until September, 1935, no child in the city of Toronto who had received three doses of diphtheria toxoid had died of the disease. In September such an event occurred. These facts indicate simply that diphtheria toxoid, like other specific prophylactics, is not effective in one hundred per cent of instances.

Reference has already been made to the high incidence of cases and the large number of deaths in Toronto in 1927. As result of sustained effort during the past eight years, at least 93,000 school children have been given three doses of diphtheria toxoid, and 110,000, one, two or three doses. In addition it is estimated that 11,000 pre-school age children have been immunized by physicians in private practice. Thus a grand total of 121,000 have received one or more doses of toxoid.

In the year 1934 in that city having a population of 630,000, *only eighteen cases of diphtheria were notified.* For a period of fifteen months from January, 1934, to March, 1935, *not one single death from diphtheria was reported.* This dramatic decline has followed widespread immunization of

children and it may be inferred that the major part of the reduction is directly or indirectly the result of the use of diphtheria toxoid.

One other point may be referred to: Dudley has recently suggested that specific prevention of diphtheria may be followed by an increase in diphtheria carriers in the community. No support whatsoever for this hypothesis has been found in investigations carried on in Toronto and an adjacent rural municipality. Among 5,290 school children in Toronto from whom nose and throat swabs were taken in 1934 and 1935, not one was found to be harbouring virulent diphtheria bacilli. In another group of 999 children, only two diphtheria carriers were discovered.

It may be concluded then that no valid objections to the use of diphtheria toxoid have yet been sustained. On the contrary, its generous use has been followed by a very great decline in mortality and morbidity from diphtheria.

Preventable Illness

IT has been pointed out that among an average million persons in the United States there will occur annually between 800,00 and 900,000 cases of illness. It may be predicted for this average million persons that, though 470,000 will not be sick during a normal year, 460,000 will be sick once or twice, and 70,000 will suffer three or more illnesses. Of those who become ill, one-fourth will be disabled for periods varying from one week to the entire year. The gigantic annual money loss in wages caused by sickness in families with small and modest incomes in the United States is estimated to be not less than nine hundred million dollars and the still larger expenses of medical care probably are not less than one and a half billion dollars. These are only the direct costs. The much larger costs of depreciation in capital values of human life are incalculable. Even the direct costs could be borne if they were distributed equally, but they are not.

Science has not yet given us the means with which to prevent all of this sickness and to enable everyone to live healthfully until the end of the natural span is reached. But the plain fact must be faced that notwithstanding great advances in medicine and public health protection, the American people are not so healthy as they have a right to be. Millions of them are suffering from diseases and over a hundred thousand die annually from causes that are preventable through the use of existing scientific knowledge and the application of common social sense—*Edgar Sydenstricker, The Milbank Memorial Fund Quarterly, vol. 13, no. 4, 1936.*

The Periodic Health Examination from Various Viewpoints*

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DURING the past twenty-five years, conservation of health by means of the efforts of our public health departments has made phenomenal progress. Mass diseases have practically disappeared or it might be more correct to say that knowledge which is available could eliminate them more or less entirely, political and financial reasons sometimes standing in the way. More thought is being given to-day as to the best and most effective means of applying our medical knowledge to the prevention of sickness than at any period in the history of our country.

At any time, but more especially in times of financial stringency, the health of the population is most distinctly a state problem. In times of depression the loss through sickness falls upon the community as a whole, whereas in times of prosperity the loss is met either by the individual and his family or some private charity. In the near future the cost of sickness is going to be borne in whole or in part by the Public Treasury, medical care for ten per cent of the population even now being provided from public funds. The state, therefore, should have a say in all preventive measures which aim to conserve health. Ranking first and foremost among these preventive measures is the periodic health examination. In this connection I would like to quote from an article by Mr. Hugh Wolfenden which appeared in the Canadian Public Health Journal:[1]

"It seems remarkable that we contemplate so seriously the alleviation of illness, while we neglect even such fundamental and elementary measures as periodic health examinations and comprehensive sickness registration. In thus ignoring these two essential measures of control, we are in effect permitting people to become ill individually, through misfortune, or ignorance, or carelessness, but when they have succeeded in becoming ill it is then said to be the responsibility of the whole community to cure them. It may be suggested, with much justification, that if people are allowed to become ill individually, the responsibility for cure should be individual, but that if the whole group is to be held responsible for illness, then the whole group should have some considerable control over the manner in which the illnesses arise."

It is not necessary to add anything to such a concise and common-sense view of the problem. I am glad to note that in both the British Columbia and Alberta Health Insurance Acts, provision is made for the periodic health examination. I sincerely hope that the rights of the family physician will not be encroached upon in the operation of these various provincial measures.

It would be much the easier way to place a departmental official in charge of this work in the various localities but all authorities are agreed that the physician who is going to administer the treatment is the physician who should do the periodic health examination, in other words, the family doctor. Dr. Cox, former Secretary of the British Medical Association, writing in the Canadian Medical Association Journal for April, 1935, says that the public health man is so obsessed by

**Presented before the Section of Social Hygiene at the National Conference of the Canadian Public Health Association with the Ontario Health Officers' Association, the Canadian Tuberculosis Association, and the Canadian Social Hygiene Council, Toronto, June, 1935.*

the idea that it is much more convenient to have this work done by somebody directly under his orders that he rarely thinks of employing a local practitioner. From the standpoint of promotion of health, the practising physician holds tremendous potentialities. It is true that he does not realize his value in this direction but he must be educated to recognize the fact that *he* can be a *health unit*. He must be educated to realize that he is responsible for the health of his clients as well as for their care during illness. Public health work has, in the past, come in for a certain amount of criticism from the family doctor because he feels that work is being taken away from him which should rightly be his. However, I have little sympathy with this attitude because the Departments of Health have not carried on any work for the individual patient which the family doctor did not first have an opportunity to do. On the other hand, the public health physician has undoubtedly many times lost patience with the general practitioner, feeling that he did not get the co-operation which he should. You must bear in mind that until a comparatively recent time universities have laid little stress and have spent very little time on teaching the advantages of the periodic health examination. Two years ago the Periodic Health Examination Committee of the Ontario Medical Association wrote to all the medical schools in Canada, inquiring what time was devoted to this subject. I regret to report that, with one or two exceptions, little or no time was given to the periodic health examination. The general practitioner has been trained in the treatment of disease and you cannot change his viewpoint overnight. He must be made to feel that it is to the advantage of his clientele to practise personal preventive medicine. At the same time it must be pointed out to him that it is a more remunerative branch of medicine than the curative. That point can easily be proved.

FINDINGS OF PERIODIC HEALTH EXAMINATION

It is rather important that we consider at this point the findings over a period of years of various groups of people who have had periodic health examinations. The nature of the impairments differ according to the social and economic status of the group examined. In giving figures, representing the experiences of various groups, we must make allowance for the evaluation of the impairments found.

The University of Toronto and Dalhousie University have reported on the health examinations of their students for the past few years. I would refer you to the reports of Dr. G. D. Porter of the University of Toronto[2] and Dr. H. G. Grant of Dalhousie University[3] to this association. Their findings show conclusively the value of the periodic health examination of the student class.

Another example of the need for this work among young people is provided by the experience of one of our large financial organizations in this province. Among 298 employees (all matriculants) accepting the offer of a periodic health examination, 769 impairments were found, or 2.57 for each employee examined. Forty-one cases, or 13.7 per cent, were referred to the family physician and placed under treatment by him. At the end of four years 440, or 57.2 per cent, of the 769 impairments had been corrected. From this small group two facts stand out:

(1) Of supposedly healthy young people 13.7 per cent had impairments necessitating actual medical treatment.

(2) The advice given by the examining physician was accepted and acted upon. This is shown by the fact that over 57 per cent of the impairments were corrected in the space of a few years.

From a manufacturing plant in the province of Quebec we get the following data: Of 1,392 employees examined, the average age being 20 years, 368 or 26 per cent had no important de-

fects. The balance, 1,024 or 74 per cent, showed 1,670 separate defects of structure or function. At the end of two years 52 per cent of those showing defects showed a marked improvement.

I would like to cite also the analysis of a group of active workers, post office employees, who were supposed to be in good health. The following classification shows the condition of this group in which none is considered as being physically fit:

Class 1. — Moderate defects requiring medical supervision as well as hygienic correction: 26 per cent.

Class 2.—Advanced physical impairment requiring systematic medical or surgical attention: 30 per cent.

Class 3.—Serious physical defects requiring immediate surgical or medical attention: 39 per cent.

The next example more or less represents the need for periodic health examination of the labouring class:

In 1925 a railway company in eastern United States examined 5,393 employees and it was found that 2,751 or 51 per cent had impairments which would definitely shorten life from five to fifteen years. In the course of three years, that is in 1928, it was found that 2,434, or 89 per cent of this group, had their impairments corrected. The periodic health examination made a definite improvement in the health of these individuals as evidenced by their need for medical care. As mentioned above, in 1925 (the first year of the experiment) 51 per cent required medical care. This dropped in the year 1929 to 9.38 per cent as a direct result of an annual physical examination.

Diabetes, as you know, has increased from year to year, particularly in the older age group from thirty-five years. Joslin of Boston gives some very interesting figures showing the advantage of early recognition. He cites two groups of cases to prove the value of early diagnosis, first, those discovered upon application for insurance, and second, those who applied to him in the role of patients. In comparing the two groups the saving in mortality was present in all ages in the first group. From the ages of fifteen to forty years the saving rose as high as 42 per cent to 50 per cent.

I would like to mention also the work being done by the Canadian Medical Institute which is supported by three of our large insurance companies in Canada. Periodic health examinations have been given to policyholders over forty years of age for the past four years. I will not burden you with figures which have been quoted elsewhere[4] but I would like to point out our findings in the relationship between blood pressure and overweight. Ten per cent of our examinees are 20 per cent or more overweight. In the 90 per cent who were normal in weight only 12 per cent had a rise in blood pressure above normal, whereas in the group 20 per cent overweight, 19 per cent had a blood pressure above normal, and among those 30 per cent overweight, 36 per cent had a blood pressure above the normal limits.

The relation of overweight to cardiovascular breakdown is not appreciated by a considerable percentage of the medical profession. In the case of the public the vast majority are ignorant of any connection.

The above findings in all the different groups represent more or less tangible impairments but, in discussing the value of the periodic health examination, we cannot overlook the less definite functional disturbance. We know that the progress of established disease is accentuated by functional disorders. Whether functional disorders merge into actual organic disease, is something which has not as yet been determined. The correction of faulty living habits such as overwork and its consequent fatigue, worry, the taking of improper rest, lack of recreation and exercise in fresh air, etc., should inhibit the progress of established disease and may, in time, be proved to prevent the onset of actual disease.

THE PHYSICIAN AND PERIODIC HEALTH EXAMINATION

The medical profession has much to learn about periodic health work. They must learn to be interested in presymptoms rather than symptoms because it is out of the former that the latter arise. The devitalized tooth, the dark sinus, frequent colds, the indefinite digestive disturbance, worry, fatigue, nervousness, slight pain, etc., are considered by many as negligible symptoms which do not lead to any pathological state. Many writers have termed them presymptoms. Thirty-five years ago Dr. Gould, in one of the first papers given on this continent advising the periodic health examination, stated:

"All good medicine inevitably tends to become preventive medicine; all good physicians labour to stop disease before it arrives. The whole ingenuity of the trained diagnostician is expended on the problem of the earlier symptom. He is the greatest discoverer who finds the presymptom or the symptom of a symptom. The greatest therapist is he who cures before the disease exists, he who starves the bacillus to death, he who stops the evil habit, thus preventing the malfunction which becomes organic disease. . . . ."

The physician must impress on his clients the necessity for a yearly check-up. Living to a ripe old age must not be held out as the only inducement. The periodic health examination, conscientiously performed each six or twelve-month period by the family physician, will discover the presymptoms which can be checked before they become definite symptoms and thus, if possible, fulfil in comfort the natural expectancy of life. Dr. Warthin of Ann Arbor, in his book on "Old Age", states that physically we are on the downgrade after forty but mentally we can develop up to sixty-five, and retain that mental state for varying numbers of years thereafter. We all want to reach those three score years and ten, but, if we do so, we want to do it in comfort and with our physical and mental faculties unimpaired. We want to make old age one of comfort to ourselves and friends, free from pain and suffering and the grouchy disposition which goes with it.

The death rate from cancer has doubled in the past thirty years. In the absence of any specific cure, surgery, radium or x-ray—separately or in combination—are the best means available. Their success, however, depends upon an early diagnosis of the condition. The late Dr. Joseph Colt Bloodgood of Johns Hopkins University, renowned as one of the world's greatest authorities on cancer, in speaking before this association a few years ago, stated:

"My personal studies of cancer of the cervix in mothers, of the skin and of the mouth, have collected an immense amount of verified evidence to confirm the statement that cancer never begins in a healthy spot and that at first there is always a definite spot or local growth of abnormal cells that are not yet cancer, and that this spot, when situated where it can be seen or felt by the individual or brought to view in a periodic precautionary examination, will lead to the prevention and the largest possibility of a cure of cancer."

The same speaker also said that cancer of the skin and mouth is being rapidly eradicated by newspaper publicity whereas the incidence of cancer of the cervix shows no improvement. The latter has undoubtedly not received the same amount of publicity as the former. In addition to much-needed publicity for the laity it is important that the profession should be taught the signs and methods of diagnosing incipient cancer. They, in turn, would also help to inform the public of the necessity for having a regular physical examination. It is also necessary to teach the public that our mentor, Pain, does not speak to us early enough in cancer. When we receive such warning it is too late to do anything about it beyond the alleviation of suffering as far as possible. Therefore, the periodic health examination is the only means available which offers any possible reduction in the death rate from this disease.

I have no desire nor am I qualified to criticize the public and private expenditure which has been incurred to furnish elaborate methods of treatment for this disease. However, I am satisfied that if a fraction of what is

now spent on treatment was spent on education the results would surpass our greatest anticipation.

Tuberculosis has been gradually on the decline but even here the periodic health examination, if generally accepted, would prove an invaluable asset. Many undiagnosed cases of this disease, both contacts and chronic, move into our urban areas from the rural districts, particularly from the sparsely settled areas of northern Ontario, looking for employment. This is particularly tragic in the case of domestic service, tragic because of the intimate association with infants and children. Two instances have come to my personal attention during the last year. In the first instance a girl with a cough received employment in the home of one of my medical colleagues. She was there only a short while when it was discovered that she had tuberculosis. For the past two years the children have been under observation and, fortunately, there have been no serious consequences. In the second instance the results were not so happy. The parents, not knowing the full significance of the cough, kept the maid in the house. First the child and next the husband became active cases before the source was discovered. In both instances the periodic health examination would have prevented these troubles. As we are burdened now by too many laws, I will not suggest the making of another one. I do think, however, that every household should demand a certificate of physical examination from employees whose history is unknown to the employer.

EDUCATING THE PUBLIC

Before the periodic health examination comes into general usage, a great deal of educational work must be carried on among the medical profession as well as the public. Medical science has made remarkable progress in the last quarter of a century. One of our problems to-day is how to apply our knowledge to the needs of the people, and how they can apply it to their needs. So far we have failed to reach the zenith which we should have. In this connection I would like to quote from the Final Report of the Legislative Commission of the Province of Alberta: "Perhaps three principal factors contribute to this failure to apply and use what we know. These factors are: ignorance, apathy, and the faulty administration of medical services and medical economics."

Ignorance and superstition have always been stumbling blocks in the progress of medical science, and they still are. Many are ignorant of the simplest principles in the art of healthful living, and many others have failed to distinguish between information which is scientific and that which is non-scientific. The physician's task is not an easy one. He must compete against modern advertising of all forms of cures for all the ills man can fall heir to, against the complacent acceptance of false claims presented in various sales talks which are in direct contradiction to applied facts and an indirect reflection on the medical profession. To enjoy health is one of man's greatest urges. On every hand there are unscrupulous individuals ready to capitalize that urge. Sixty million dollars is spent annually by the Canadian people for medication, and only fifteen million dollars of this is by a doctor's prescription. The public must be taught the folly of self-diagnosis and the use of highly advertised "cure-alls". It is the duty of physicians to work towards this end with as much enthusiasm and imagination as the man advertising his quack wares. It is here, through the medium of the periodic health examination, that the family physician can assume his proper role as health adviser to the laity.

For many reasons the average adult individual shirks a periodic health examination. He is feeling well. Why bother about his health? Remember the adage, "Let sleeping dogs lie". It is time enough to consult a physician when he is sick. Then, too, why spend unnecessary money when there are al-

ready so many demands on the not-too-adequate income? etc., etc.

It will be hard work, pioneer work, to make the present adult population concede the necessity for a periodic health examination. This work has to be done by the family physicians who must first of all themselves be fired by a zealous interest in the subject. Once the spade work is done the rest is easy. Let me give you a very homely example: Parents teach their children the necessity for clean hands, especially at meal times. Little boys and girls find this a bore and don't see why they should bother. However, constant reminders from grown-ups finally achieve the desired result. We wash our hands first because "they" tell us to, later because it is an acquired habit as nearly involuntary as any acquired habit may be. So, too, the periodic health examination may become with the individual an acquired habit, but just as much careful patient prodding is necessary as in the case of the parent who thrusts cleanliness upon an actively disinterested youngster.

Let us consider this, our final point, from two angles:

(1) The healthy individual.

(2) The economic aspect of the plan.

I have already pointed out that great sums of money are spent annually on medication as a result of self-diagnosis. The public must be taught by means of magazine articles, newspaper columns, radio addresses, etc., the value of the periodic health examination. The individual must realize that men who are trained for the job are better qualified to diagnose his case than he himself, and that their treatment is far better than the hit-or-miss treatment he gives himself. Up to the present the individual has not looked upon the physician as the man to keep him well, but rather as the man to get him well after the much-advertised liniment or tonic has failed to work the promised magic cure. The public to-day wants advice as to how to keep well and it will be the fault of the profession if this opportunity is neglected. It will not be a *too* difficult task to teach the public to look upon the physician as the individual who helps them to keep and to enjoy their good health.

After all, there is something in the idea of the Chinese who pay their doctor as long as they are well, but who cease to pay when they become ill. I would not suggest anything so drastic as this but I do believe that such a system would keep both physician and client vitally interested in the subject of health; the physician for a monetary reason, the client because he is, of course, always interested in keeping his strength and vitality. The periodic health examination is the only means whereby the individual can keep a check on his health and this examination should be performed every year by the same physician. This brings us to a weakness which a few individuals exhibit; those (I am glad the number is few) who just love to "shop around" to see if the different examiners "jibe" in their opinions. That is an idiosyncrasy which must be nipped in the bud whenever found, and for very self-evident reasons.

It will be hard to make a healthy man, earning a small income, see the necessity for spending money on periodic health examinations for himself and his family when the money is so much needed for the very necessities of life. This must be attacked with patience and kindliness. The people must be made to see that a little money spent annually will very probably save a great deal of money in the long run. In this day of "budgets" room must be made for the periodic health examination just as we make room for our life insurance payments; in fact it is life *assurance*.

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Clinical and Radiological Aspects of Silicosis*

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CLINICALLY silicosis occurs in two forms, simple silicosis and silicosis with infection. Infection in silicosis, in the majority of instances, is as a matter of fact tuberculosis and this is the chief cause of death. There is, however, increasing evidence that tuberculous infections are not the only ones which alter the clinical and radiological manifestations in this disease.

Diagnosis in silicosis resolves itself as much into recognition of type as differentiation from other pathological lung states. It is based on the data supplied by:

(1) History—particularly that of the inhalation of adequate quantities of dust containing silica. This is generally termed the history of exposure.
(2) Symptoms and clinical signs.
(3) Laboratory investigation.
(4) Specific x-ray appearances.

History

Of these four perhaps the most important, from the standpoint of diagnosis, is history of exposure. Logically it would come first in the examination because when elicited it tends to direct future enquiry and helps to explain signs and symptoms otherwise somewhat vague.

With very rare exceptions inhalation of significant quantities of silicious dust occurs only in certain industrial occupations. Thus, to bring out the history of exposure, minute enquiry into the working life of the individual is necessary and, as his occupational activities are apt to change, should include enquiry into past as well as present occupation. This may be carried out with reasonable accuracy by ascertaining the age at which the particular patient left school and the successive occupations which have engaged his activities until the date of examination, with the approximate time spent at each type of work.

This method is inclusive and is not unduly time-consuming. It is generally surprisingly complete, for individuals seem able to remember well the various jobs they have filled when these are brought out in chronological order. The accuracy of the history may be roughly checked by comparing age at which work commenced and the age at time of examination.

Symptoms and Clinical Signs

Silicosis presents no symptoms and clinical signs which are pathognomonic. Some are, however, sufficiently suggestive to enable a diagnosis from other lung conditions approximating accuracy to be made if history of exposure is also obtained. This is at least true in the more advanced cases. It is also, however, true that even when one is reasonably certain of the diagnosis arrived at in this way, one prefers to have it substantiated by the x-ray film.

In so far as differentiation between types is concerned, often more accurate information is gained through the consideration of symptomology, physical examination and laboratory investigation than is afforded by the x-ray photograph.

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Dyspnoea

The commonest symptom encountered in silicosis is shortness of breath. This may be very slight, noticed only on considerable exertion, or may amount to extreme dyspnoea even at rest. Dyspnoea in silicotics presents a peculiarity worth noting. It is rarely accompanied by orthopnea unless true asthma or some other pathological condition related to the production of dyspnoea, is associated with it. Dr. W. P. Warner first drew my attention to this peculiarity. I have since been able to verify the accuracy of his observation.

Chest Pain

Chest pain is common. It varies from a feeling of restriction to actual chest pain and is usually experienced in the mid-portion of the anterior chest or at the lateral bases.

Dizziness

Dizziness is usually associated with some unusual muscular effort. It may be present on change of position or on assuming the upright position first thing in the morning. It would generally seem to be related to breathlessness.

Fatigue or Weakness

Fatigue or weakness although complained of are not symptoms of simple silicosis, but they should always suggest a complication, generally tuberculosis. Silicotics do tire easily, however. It would appear that this tiring also is associated with breathlessness.

Night Sweats and Significant Loss of Weight

Night sweats and significant loss of weight always suggest complicating infection. Only in the late stages of apparently simple silicosis does loss of weight take place. Early silicotics tend to put on weight and this occurs even in those who do not admit dyspnoea. It is probably related to a slowing up as a result of their dyspnoea.

Sleeplessness

Sleeplessness is quite common. It is not a favourable symptom, probably because it adversely affects their general condition. Sleeplessness is often the result of excessive cough.

Cough

Cough generally associated with more or less sputum is frequent. It is not in itself a symptom of silicosis. Nearly all men exposed to dust cough. I feel that the cough in these men is essentially due to irritation from the inhaled dust particles. It often clears when the man is removed from dust or a positive pressure mask is worn although his silicosis remains. Silicotics, however, do often cough and this is almost always associated with phlegm. When the disease is well established much cough and expectoration should be looked on with suspicion, particularly if other indications of an infective process are present.

Hæmoptysis

Hæmoptysis always suggests a tuberculous process. Nevertheless in some cases, apparently simple, blood-stained sputum and the occasional small hæmorrhage occur.

Signs

Expansion—Just as dyspnoea is the cardinal symptom, so limited expansion is the commonest sign. It may be demonstrated by the tape. It is often better appreciated by palpation, the palpating hand receiving the impression of marked loss of resilience and elasticity in the chest. Expansion may be very limited; if so, the anterior chest wall tends to be lifted forward, with the accessory muscles of respiration prominent. In most cases with shortness of breath and limited expansion the respiratory rate is somewhat increased.

Percussion Note—In general the percussion note is altered and there is definite impairment. As this impairment is apt to be equal on the two

sides of the chest it is frequently overlooked.

Breath Sounds — Definite changes can be made out in the breath sounds in most cases. The commonest change is in intensity. Breath sounds in silicosis tend to be distant or blanketed. They are frequently emphysematous in character with prolonged expiration. Many cases also show a shortening of the inspiratory phase with a rise in pitch. This change in the breath sounds has been referred to as a thinning or pinching out of the inspiratory phase, which describes it fairly well.

Adventitious Sounds—Adventitious sounds in general are of the same significance as in other chest conditions; particularly is this true in regard to those associated with tuberculous involvement. In silicosis the common adventitious sounds are râles and rhonchi.

In apparently simple silicosis râles are sometimes heard, however. Their commonest sites are the interscapular areas and the lateral bases. Although such râles are heard in cases apparently uncomplicated, in general râles should be looked on with suspicion as indicating a complicating process and the presence of tuberculosis should be ruled out before accepting the case as simple. Râles below the upper third of the chest are of relatively more importance in silicosis than in those without silicosis, because of the frequency with which tuberculous lesions appear about the hili or in the bases in these cases.

Cyanosis—Cyanosis is not a prominent sign nor is clubbing of the fingers except in old, long-standing cases with massive fibrosis. Where cyanosis is present, except as mentioned above, other disabling states, possibly of cardiac origin, should be suspected. This is particularly true if orthopnoea is also present.

LABORATORY AIDS

Many laboratory means of investigation are applicable to silicosis. Of these the most important is sputum analysis for the presence of the bacillus tuberculosis. It is wise to conduct frequent sputum analysis and a case should not be considered simple merely because two or three specimens of sputum have failed to show the presence of bacilli. In practice it is well to have cultures made or guinea-pig inoculation carried out, in addition to examination of the direct smear.

Radiological Aspects

In order that the radiological appearances peculiar to silicosis may be appreciated let me very briefly indicate the pathological changes which occur when silica enters the lung. These pathological changes are intimately related to the x-ray appearances because the x-ray chest photograph is a shadowgraph and the shadows seen in the x-ray are those cast by the structures comprising the chest contents and their enclosing walls. It must be understood that within moderate limits these shadows exhibit variations in the healthy chest and that within certain limits normal shadows shade into certain of those usually ascribed to pathological changes.

When foreign particulate matter is inhaled a physiological response occurs throughout the respiratory tract which aims at its elimination. Much foreign matter is removed from the inspired air by the surfaces in the mouth and nasal cavities. Much is removed by means of the ciliated epithelium on the walls of the bronchi being wafted outwards by the action of the cilia to be expectorated or swallowed. Large or moderately sized particles of over ten microns are handled in this way. Such particles even when composed of silica do not reach the lung proper and are therefore not concerned in the production of silicosis.

Fine particles of ten microns or less may reach the alveoli of the lungs. Most which arrive there are very fine —of the dimensions of one micron or less. The lung has a mechanism by which it is cleared of these fine particles. If the material composing the

particles is readily soluble in the tissue juices the particles are dissolved and excreted. Particles not so readily soluble are gathered by special migratory phagocytic cells termed dust cells, and are conveyed by them towards the lymphatics of the lung to be carried by this drainage system to the hili and deposited in the tracheobronchial glands and other nodes situated there.

It must be understood that the lung lymphatics consist of a system of channels and anastamosing cross-channels which form plexises around the blood vessels and bronchi. These channels drain to the lung roots and extend there from remote parts of the lung even from the pleural surfaces. At the distal ends of the filaments of this system and along their courses, particularly at points of divergence and anastamosis, aggregations of lymphoid tissue occur. These aggregations situated outside the luminae of the lymph vessels increase in size as the lung roots are approached.

Dust cells which have gathered their load of particles in the lung air spaces make their way through the alveolar walls and travel through the lung substance toward the lymphoid aggregations by which their contents are passed to the lymph drainage system to be carried away. Unless the particulate matter is in excess, these processes are able to keep the lung free and under normal conditions the drainage system operates smoothly. When, however, foreign material is in excess congestion occurs in and about the lymphoid aggregations by the piling up of dust-laden phagocytic cells. These aggregations enlarge and press on the walls of the lymph channels so that narrowings of the channels occur with consequent partial obstruction to the lymph flow. Thus the lymph passages in turn become congested and if this congestion is continued a serous increase in the tissues surrounding the lymph vessels is produced. Sometimes this serous change is associated with a small amount of fibrous tissue formation.

Remembering the previous statement that the chest x-ray photograph is a shadowgraph, it can be appreciated that this congestion and serous change is reflected in the x-ray shadowing by an increase in the normal linear shadowing, by the appearance of heavy hili, and by linears showing beading. Such appearances in the x-ray are frequently erroneously ascribed to fibrosis. Some fibrosis may occur but much of this appearance may be accounted for by congestion. Very often this has been observed to diminish as evidenced by receding x-ray shadows when exposure has been discontinued. These appearances can be observed whenever the lung is subjected to excessive dust exposure no matter what the substance composing the dust may be. When, however, dust contains silica in adequate quantities further changes occur which are peculiar to this substance.

Silica particles are engulfed by dust cells in the same way as particles of other substances. The action of the dust cells is, however, materially changed in the presence of silica. These cells are unable apparently to phagocyte as many particles of silica as of other dusts. Silica at first stimulates the dust cells to increased activity and later paralyses them and probably occasions their death. In the presence of silica the loaded phagocytes travel towards the lymphoid aggregation in large numbers where they become piled up and mummified. In this way the basis of a nodule is produced. This nodule is finally invaded by fibrous tissue and this occurs in the lung substance. Thus the lung tissue becomes more or less generally seeded with scattered fibrous tissue nodules which are characteristic of silicosis. This nodulation can be demonstrated somewhere in all fibrous tissue growths resulting from the action of silica.

It should be realised that the appearances in the x-ray which correspond to the fibrous tissue nodule formation

are nodular shadows. These are characteristic of simple silicosis. Such appearances persist unless the underlying nodule is altered by factors which affect the fibrous tissue growth. Fibrous tissue growth in the lung where silica is involved in its production becomes altered through circumstances affecting the lung substance or stimulating this growth. Individual fibrous nodules frequently coalesce with neighboring nodules and give rise to relatively large areas of fibrosis. Infections also occasion considerable areas of fibrous tissue formation. This is probably brought about because the damaged lung is unable to free itself of the inflammatory process before fibrous tissue invades the affected area. In such ways massive fibrosis occurs and this is reflected in the shadowgraph. Such shadows are characteristic of complicated silicosis. It will therefore be seen that the shadows of silicosis are essentially nodular or massive or a mixture of the two.

Silicotic shadows are, however, always bilateral and tend to appear more or less throughout the whole lung fields. They appear primarily in the mid-portion of the lungs, generally first on the right side.

Radiologically as well as clinically silicosis is described as simple or complicated. In general, from the x-ray standpoint, the condition is considered more advanced when the shadowing is more intense, or it indicates the presence of accompanying infective processes.

In its simple form the shadows of silicosis are nodular and a diagnosis of silicosis is not warranted short of the appearance of nodular shadows.

This nodulation may vary within fairly wide limits, in size, in intensity of distribution, consistency and form. It tends to be rather evenly distributed throughout the lung field, but primarily appears in the mid-zones about the lung roots and is often of greater intensity on the right side.

The individual nodule may be small, scarcely the size of a pinhead, or moderately large approximating 6 mm. in diameter, but the size of the nodules in any single case of simple silicosis is roughly uniform. These nodular shadows may be poorly defined and apparent only on close scrutiny of the film, or sharply defined and of moderate brilliancy. The form of the nodule is roughly spherical with definite edges which are frequently rather irregular.

In early silicosis, in addition to nodular shadows the shadows of the hili are increased and the linear shadowing stands out prominently. As the condition progresses the linear shadows become less prominent and are eventually lost and the hili shadows recede. Persistence of the hili shadows should be looked on as indicating probable infection. In company with these changes the nodular shadowing becomes more intense and often the individual nodule appears larger.

In silicosis, apparently uncomplicated, areas are sometimes seen in the film in which the nodular shadows are run together. This conglomeration is probably occasioned by lung injury, the result of localised areas of infection which has increased the fibrous tissue growth in these areas but in which the infective process has died out.

You will observe that within certain limits the nodular shadows of simple silicosis exhibit variations. It would seem that these variations reflect some differences in the underlying pathological processes. They certainly appear to be related to differences in type and intensity of exposure.

Silicosis and Infection

Shadows indicative of obvious tuberculous disease may appear in the film together with the nodular shadows of silicosis. Of course when this is so the case under consideration cannot be considered one of simple silicosis. In addition there are types of shadows and changes in the appearance of the individual nodule occasioned by the presence of coincident infection in which the infective etiology is not so

obvious. In this category are placed those in which the nodules present undue brilliancy, either general or in localised areas, those in which the nodule is unduly soft with rather fuzzy edges which shade gradually into the surrounding substance of the shadowgraph, and those in which the nodules composing the picture present marked irregularity in size, outline and density.

Infective silicosis is also associated with the presence of massive shadows, with or without accompanying nodulation. These shadows are of homogeneous density and are symmetrically or asymmetrically placed. Shadows of this type are always considered to be of infective origin. Nevertheless it frequently happens that neither from the history nor by the subsequent behaviour of the case can the infective element be proved. Such shadows give more trouble in diagnosis than the nodular type. When shadows of this kind are present in the x-ray photograph of a patient silicosis as their underlying cause should be ruled out before their presence is ascribed to some other condition.

DIFFERENTIAL DIAGNOSIS

It is true that certain other pathological states than silicosis give rise to nodular shadows in the x-ray film. Of these the one most likely to be mistaken for silicosis is tuberculosis of the miliary type. Quite apart from other means of differentiation, such as the clinical behaviour of the case, these conditions can often be differentiated by close scrutiny of the type of nodule presented. In tuberculosis the nodule is rarely homogeneous. It has the appearance of a cluster of fine nodules embedded in a fuzzy matrix. Widespread tuberculous mottling may give trouble. In this condition the shadows will be found to vary greatly in size, to present ill-defined edges and to have a general fuzzy appearance.

Old calcified primary lesions if widely distributed are sometimes ascribed to silicosis. The brilliancy of these shadows with their irregularity in size should suggest their origin.

Generalized pneumonitis, the result of infection probably from the upper respiratory tract such as sinus infection in which the infective organism is of low virulence, may occasion x-ray shadows hardly to be distinguished from those of infective silicosis. The history and general behaviour of the case offer means of differentiation.

Mycotic infections are sometimes associated with the production of nodules. These may generally be distinguished by the type of nodule, which tends to be more clear-cut, circumscribed and of greater brilliancy than those of silicosis.

Metastatic tumor growths frequently give rise to a nodular type of shadow. In general these shadows are less homogeneous and much larger than those occasioned by silicosis.

In any case in which it becomes necessary to differentiate silicosis from some other pathological lung condition do not forget the importance in this regard of history of exposure.

Finally, this subject of silicosis is of considerable importance from a medical standpoint, for silicosis in the individual, although often not associated with marked disability, is frequently seriously disabling. All sufferers with silicosis are particularly prone to other lung infections which in their case tend to be very serious.

It is estimated that in Ontario upward of ten thousand individuals are engaged in trades which carry a silica hazard. Among these since 1924, when a serious interest began to be taken in this problem, some five hundred cases have occurred. During this period upwards of a hundred have died from causes directly associated with silicosis. The greater percentage of these died at the height of their productive period — namely, between the ages of thirty-five and forty-five.

Problem Children, their Parents and Teachers*

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WITH a subject of such extent it is necessary to limit the aspects discussed in a brief paper. It is proposed therefore to limit the discussion to behaviour problems mainly of environmental origin and to some treatment aspects of these. The behaviour problems of environmental origin are promising in outlook because of the possibilities of manipulating the environment of the child, because of the relative simplicity of causation of the problems, and because of the desire of both parents and teachers to assist the child.

The child's environment may be divided into three parts: the home, the school, and the neighbourhood. Direct attack on the undesirable features in each of these is possible—by suggestions to parents and teachers as to methods of discipline, by modification of their attitudes toward the child's behaviour, by supervision of the neighbourhood contacts of the child, by provision of desirable associations and sometimes by more drastic changes of environment when indicated and recreational opportunities. Giving the child an appreciation of the significance of his behaviour in accordance with his understanding should, of course, not be forgotten.

For most of us the pressure of work prevents repeated contacts with the child, the parent and the teacher. Consequently the modification of attitudes is necessarily left in other hands, usually those of psychiatric social workers or public health nurses.

Shortage of time and scarcity of workers in comparison with the large number of cases seen make such educational work much less intensive than one would wish. They necessitate a selection of the home and school situations in which the parents are intelligent and where good co-operation can be expected.

Some Problem Cases

Errors in child training on the part of parents are very numerous and varied, although practically all are made with the very best of intentions. We are frequently confronted with selfishness, jealousy, self-pity, and spite reactions, complacently rationalized under the name of parental love. There is the over-ambitious parent who insists on his child having an "education", as he terms it, no matter how unfit the child may be for secondary school work and sometimes for ordinary grade work. There is the parent who is so unconcerned about his child's anti-social behaviour as to refuse available measures and to say that the jails are maintained for such. There is the over-strict parent who tries to dominate the child even in adolescence when the latter is reaching out for independence.

One frequently sees in children the direct results of faulty adult patterns of behaviour. Recently a mother was seen who could not understand why her ten-year-old daughter was having temper tantrums. When the father was interviewed he shed, unconsciously, much light on the situation by informing us that his wife had always had a violent temper and that in these tantrums she would hit the child over the head with whatever she had in her hand. A boy of seven was brought to

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our attention with a history of night terrors and being afraid to sleep anywhere except in his mother's room. While discussing the matter with the mother it was discovered that all the children, numbering six, had night terrors. The mother herself complained of peculiar sensations in her head, sleeplessness and indigestion. As a result of the mother having a rest in a convalescent home for six weeks, the night terrors of all the children, which had disappeared during her absence, have not recurred in the six months since her return home.

In the treatment of these problems in children, it must be borne in mind that the parent very often has his own problems. His attitude and behaviour toward the child may be due to something entirely apart from the child's conduct, but may, nevertheless, cause the latter's behaviour problem. Education on this point may be sufficient to change his behaviour and the child's reaction to it. In some cases, however, it is necessary to provide some other satisfaction or outlet for the parent's feelings. Some parents will get satisfaction from having a type of behaviour prescribed by the physician, whether or not they understand its significance; these parents like to lean on authority and look for approval. Others, independent or antagonistic, may be led to the place where they themselves suggest desirable modifications in their behaviour, or to the place where their attitude is changed, perhaps unconsciously.

Direct work with the child is often essential in order to build up a good working relationship with a defensive parent. Later the destructive effect of the parent's attitude may be taken up. An example of this type of situation is to be found in a fifteen-year-old boy who had been running away from home. The father was a very aggressive, domineering man. He would not have listened to a direct attack on his methods. He expected the clinic to find the cause of the bad behaviour in the boy, not in the boy's relationship with his father. Partly as a result of our efforts the running-away was stopped, but its place was taken by a cynical, resigned, withdrawing attitude —a more serious reaction than the original one. It may be possible yet to change the father's attitude, and without doubt the boy's behaviour will then improve. This will serve to illustrate the need, in some cases, of not concentrating on the behaviour problem so much as on parental attitudes which frequently lie behind it.

What attack, through the parents, can be made to prevent the development of children's behaviour problems? A large factor in the parents' behaviour toward each other and toward the child is the example they had before them in their own homes. The attitude of one parent towards the other, and the methods of meeting domestic situations are important factors in the individual's behaviour when he himself becomes a parent. Every day we hear a parent say, "I am trying to follow the example of my mother in bringing up my own child." Much of this training is usually valuable. However, it is the undesirable parts with which we are concerned here. How can these influences be counteracted?

VALUE OF PARENT EDUCATION

Parent education is one valuable method. As parent education groups are organized at present, however, it would often seem that they are reaching the people in least need of such education. They sometimes stir up problems where none had existed previously. There has been a tendency in some groups for the type of education to be too intellectual in its theory and presentation. Parent education would be more widespread if it were made available. There are many parents asking for it and there are, undoubtedly, many more who would seize the opportunity for such instruction, were it presented. The chief difficulty is to find the funds to carry on the work.

One possible avenue by which everyone could be reached is through the schools. In order to reach every child before he leaves school, it would be necessary to begin such training in the public schools. Could the material be presented in suitable form to children in the higher grades of the elementary schools? This question could be answered only after consultation with the educationists as to the method of presentation and as to curricular provision for it. At a recent meeting for discussing psychiatry in education it was urged that mental hygiene material should be presented as part of the home economics course in the schools.

THE PLACE OF THE TEACHER

We turn now to the place of the teacher in relation to behaviour problems of children. We have come a long way since the days when the teacher referred a child for mental examination with the sole purpose in mind of getting rid of him. It is, in my experience, rare to find a teacher who refers slightingly to the class for mentally retarded children, or who tells a child that the mental examination is preliminary to his being admitted to an institution for the feeble-minded. In such instances I consider it my duty to discuss with the teacher her attitude. If this remains one of disparagement the situation should be taken up with the Superintendent of Schools. We are, however, quite safe in saying that almost all teachers are actuated by the desire to help the child and are anxious for any assistance from the mental hygiene clinic towards that end.

One of the chief difficulties that teachers have is their viewpoint on behaviour problems. There is a tendency on the part of many teachers to judge the child, to diagnose, to call him hysterical or psychopathic, instead of looking for a simple cause for the undesirable behaviour in the child's environment. Regarding teachers' viewpoints, the study by Wickman, in which he compared the attitudes of teachers and mental hygienists towards various behaviour problems of children, is of much interest. There was found a very definite, and quite understandable, emphasis by teachers on the forms of behaviour more troublesome in the classroom. The mental hygienist, on the other hand, regarded as more serious indications of maladjustment such personality difficulties as fears, timidity and seclusiveness.

This difference of opinion serves to illustrate the need for close contact between the teachers and the mental hygiene clinic staff. It is, in my opinion, undesirable that the teachers should view the mental hygiene clinic merely as an organization to which a child can be sent for examination and from which a written report will be received giving directions as to what to do for a certain type of behaviour difficulty which a certain child shows. It is desirable that teachers and mental hygienists work together, each contributing to the solution of the problem. The mental hygienist cannot know the classroom situation as well as the teacher; the latter has a real contribution to make here, and also in the application of her knowledge of educational techniques. The mental hygienist can give the teacher a viewpoint, as well as the benefit of expert knowledge. This education of teachers is, perhaps, the most important function of the mental health clinic dealing with children's behaviour problems, as most of us are reaching only a small number of the problem cases in our field of activity.

The teacher is the key to the mental health of the school-age child. One authority has recently estimated that 35 per cent of school children present problems which would be benefited by the attention of a mental health clinic. We have not, and probably never will have, enough staff on our clinics to give service to this large proportion of school children. The teacher should have appreciation of the significance of mental health in regard to these

problems and should be trained to do much towards clearing up the simpler problems and preventing the development of others. It should be necessary for her to refer only the more serious problems to a mental health clinic.

To this end teacher-training schools should include in their curriculum the mental hygiene of childhood. Such a course should give the teacher an appreciation of individual differences in children, not only in intelligence but also in emotional stability, persistence, verbal ability, etc. It should give the teacher some notion of the best way to manage the aggressive, hyperactive child; of what should be done to draw out the timid, shy child; of how to deal with the tense child with choreic tendencies; with the stammerer, the left-handed child, etc. Such a course would not be an extra load for the teacher, but would be of very real assistance to her in her classroom management.

Close contact between parents and teacher is an insurance against the child becoming a behaviour problem in school. It is a good practice to encourage parents to visit the school to discuss, with Johnny's teacher, his progress and conduct. The teacher should be encouraged to visit the homes of her pupils. It is not long since homework, apart from the child himself, was the only link between the home and school. The spread of home-and-school groups has brought many parents to the schools. There is still a long way to go in having teachers visit the homes. Yet I believe it would repay them to do so by making discipline easier in school. I can think of instances in which a visit to the home gave the teacher an appreciation of the child's background and motives for behaviour, so that thereafter she was able to motivate him in desirable behaviour.

Instances of teacher-pupil friction as a cause of behaviour problems are less frequent in our experience than maladjustment to the curriculum. Children of dull normal intelligence constitute the group which has perhaps suffered most in this respect. Such children become discouraged through facing continual failure. They repeat grades and become associated with younger and smaller children. Consequently they play truant and provide a considerable proportion of the juvenile delinquents. The provision of a suitable curriculum in some of the public schools of Toronto and in the new Church Street Non-academic School for Boys, has resulted, according to statements of principals and of the Chief Attendance Officer, in improved attendance, increased work interest, and a decrease in disciplinary problems and in juvenile delinquency.

In conclusion: we have been speaking about the faults of teachers and parents; what about those of mental hygienists? One very real need for mental hygienists is to remain entirely objective in relation to all the individuals in a situation. It is difficult to do this, and at the same time give the various individuals the feeling that you are sympathetic and that they are getting an understanding hearing. There is a tendency to identify one's self with a certain person in the case whose position stirs one's sympathy. This is dangerous, because other persons in the situation sense that you are taking sides and your influence is largely destroyed.

We often meet parents and teachers who come for advice in order to corroborate some cherished point of view of their own as to the causation of behaviour problems. We, in the mental hygiene clinics, have to avoid just the same error. As Dr. Esther Richards has said, "the greatest thing one can bring to the study of such problems is a mind so unprejudiced by special lines of thought that one is not forever trying to formulate a panacea for the mass, but is willing to apply time, patience, and common-sense understandings to the child here and there who finds it hard to get on with the world of activity and thought."

Industrial Dermatoses*

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THE occurrence of skin diseases in industry is becoming increasingly common and yearly a wider range of irritants comes into use to produce them. Older text-books on dermatology, written about twenty-five to thirty years ago, hardly mention industrial skin lesions except infections, abrasions, burns and keratoses; neglecting almost entirely eczematous eruptions. The wide expansion of industry during this period, with its infinite capacity to bring into use new and sometimes very irritating chemicals and materials, forces us to recognize certain clinical evidences of their injurious qualities. This fact is admitted in most countries, and it is only right and proper that workmen so exposed and injured should be compensated.

It is quite impossible for me in so short a paper to make a comprehensive survey of these injuries, infections and irritants as they affect the skin. I would like, therefore, to leave out all those accidents obtained by workmen, such as minor injuries, burns, scalds, abrasions and keratoses, and also I shall say nothing of infections such as tuberculosis, anthrax, actinomycosis, etc., confining my remarks entirely to those eruptions of an eczematous nature which are becoming increasingly common.

Let us examine first some of those occupations in which it is common to find this eczematous reaction. Bridges[1] gives a very comprehensive survey of these trades and lists the important ones:

1. Dyers and printers.
2. Domestic servants.
3. Metal platers and polishers.
4. Bakers and confectioners.
5. Leather workers and tanners.
6. Chemical workers.
7. Rubber workers.
8. Oil refiners.
9. Wood workers.
10. Textile workers.
11. Metal workers.
12. Engineers.

This list provides a wide range of major industries in which under certain circumstances eczematous eruptions may occur. One might further sub-divide these industries into an endless number of related trades wherein trouble on the skin might be expected because of the irritant substances used. Common irritants and chemicals used in the above group of industries[2] naturally again fall under larger headings, such as alkali, sugar, oil, turpentine and substitutes, dyes, chemicals, French polish, metals (nickel), accelerators, gasoline and spirit, dust, and acids.

One should also mention friction and heat and cold; their influence in producing a secondary dermatitis following injury.

White[3] estimates that yearly in Great Britain between 18,000 and 19,000 new cases of skin diseases are caused by occupation. Compensation was paid to over 6,000 cases in England in the five-year period 1927-1931 inclusive, because of dermatitis and ulceration of the skin produced by dust and liquids. One need only read the reports from that country to note year by year an enlarging group of cases in a wider field of industry being

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regarded as occupational and therefore compensatable to be impressed with the importance of the subject.

Having examined the various industries and the substances used, can we now explain why certain individuals exposed to these substances react in an eczematous fashion whilst others escape completely even though exposed to high concentrations of these irritants? It goes without saying that many materials are first class irritants and cause a dermatitis in all who are exposed to them. It is not this group especially with which I am dealing, but rather the group of substances that either suddenly or gradually render sensitive a few individuals. As no change occurs in the substance we must look to the individual so sensitized to determine why this eruption occurs. Undoubtedly certain conditions obtain either systemically or locally to foster this allergic sensitization and it is interesting to speculate upon what contributory factors in the individual, in conjunction with the irritant used in industry, can bring about this sensitization.

1. Lewis[4] states the hands are exposed to light, wind and changes in temperature and are most often submitted to pressure, tension and friction. He makes the further observation that injury to these parts by any of these physical agents throws the contractile mechanism of the vessels out of commission thus leading to increased redness. The minute vessels of the skin become irresponsive and under these influences lose tone and dilate. Such circulatory stasis, even though temporary, may enhance the local effects of irritating substances.

2. Though little is known regarding any internal process in eczematous eruptions, yet nervous states resulting in moist sweaty hands may be a definite causative factor and so, too, the excessive dryness of the skin in ichthyotics may predispose them to industrial types of eczema.

3. The condition of the skin in debilitated states as tuberculosis, chronic rheumatism, etc., may also favour sensitization.

4. It is well known that diabetes definitely favours the growth on the skin of staphylococci and various fungi. Gardiner[5] lays great stress upon illness as a predisposing factor of occupational skin eruptions. He states that in one year 13.8 per cent of his cases came after influenza or pneumonia, 28 per cent suffered from seborrhoea and 27 per cent showed excessive sweating.

5. The past few years have brought into prominence the subject of fungus infections which, though affecting the feet at first, later, through some allergic mechanism, affect the hands. These dermatophytides (so-called) produce blisters which rupture, thus exposing the workmen as never before to the irritants being used. Yeast infections locally may also do the same thing.

6. The taking of some of our commoner drugs—bromides, iodides, quinine, phenolphthalein, the barbiturates, and the use of homely remedies such as cleaning solutions, hand lotions, hair tonics, etc., followed by a limited follicular staphylococcus infection and its spreading eczematoid reaction.

While it is undoubtedly true that some of the above mentioned factors may on occasion contribute to a sensitization eczema it is also true that these dermatophytides, drug eruptions and infectious eczematoid dermatites may occur as clinical entities not in any way related to occupation. Therefore the diagnosis between the industrial lesions and those of drug eruptions, psoriasis, seborrhoeic types of eczema and lesions directly or indirectly due to fungi is, as a rule, easy for the practitioner who is thoroughly familiar with skin diseases and can be made at once; yet some cases are most confusing and require a long investigation.

The differential diagnosis between these various clinical entities and that of industrial dermatitis is at times difficult to establish with any degree of certainty, but by a process of elimination it is often possible to state

that the eruption is or is not due to occupation. Medical men must realize that no matter how innoxious a substance has been formerly, certain circumstances may alter it or the skin, so that a reaction occurs.

These eczema-producing substances can on occasion be identified by two main tests applied to the skin, the patch test and the clinical test.

The patch test is usually made as follows: A small ½-inch square of blotting paper is moistened with the solution to be tested, and covered with a very thin piece of linen and then with thin rubber. This is applied to the skin of the patient and held in place with adhesive tape. The arms, over the shoulders, or the thighs are the usual sites selected. The patch is removed in twenty-four hours and the reaction, if any, read in from thirty-six to forty-eight hours after application. This test may seem simple enough, yet many factors, such as too high concentration of the substance tested, may cause false positives. The hyper-irritability of the skin at the time tested is another factor, so that generally speaking considerable experience is needed in order to read and interpret reactions. A positive test does not necessarily convict that substance any more than a negative one rules it out. Extensive tables have been compiled giving the dilutions of most test substances irritating a normal skin; therefore, our dilutions must remain below this point. It is not infrequent that these tests are confused with scratch or intradermal tests which in the case of industrial eczema will in no way answer. Industrial eczemas are generally conceded to be reactions of the skin confined almost entirely to the epidermis; whereas the usual scratch test as used in hay fever or asthma is applied much deeper in the cutis and therefore in tissue not primarily involved in the inflammatory process. Reactions of various types are encountered, such as erythema, papules and vesicles, and tend to simulate the original eczematous lesion.

While the patch test is our best means of control one realizes that other things, such as heat, cold, friction, etc., also play a part in producing the eczematous eruptions; and these factors cannot be reproduced in our test. It has been noted, too, that though the original eczema may involve one part of the body, tested areas far removed from that part may not react positively. Sulzberger and Wise[6] state that the contact or patch test has proved indispensable in occupational dermatoses.

The second means of determining by test is the clinical trial, i.e., removing the patient from contact with the suspected substance to see if the eruption retrogresses. This test, too, is sometimes of doubtful value because eczematous reactions, once produced, generate local toxins capable of exciting distant eczematides as well as maintaining local inflammation for more or less long periods.

Numerous patch tests, even though inconclusive as regards the irritant substance, often reveal by many positive reactions a subject suffering from a true allergic type of eczema. An individual easily sensitized, having inherited allergies, is therefore one to exclude from unsuitable occupations.

It is true that the workman is exposed to irritants during his working hours, but one cannot complete the picture without considering such homely irritants as soaps, cleansing solutions, hair lotions, creams, dyes, patent remedies, etc.

As a means of prevention of industrial skin disease the patch test might come into wider use. In this way workmen entering an industry might be tested for sensitivity and if found unduly so could be placed in some other industry, or at least some other department of that industry. The practitioner on the one hand is inclined to accept a case as occupational when contact with a known irritant is followed by an eczematous change. This places too heavy a burden on industry. On the other hand, because he cannot

directly discover and identify an irritant he concludes the eruption is not occupational. This is unfair to the workman.

The medical man trained in dermatology is best able to answer these questions which so often arise in connection with cases of eczema in industry. His special training is necessary to exclude certain unrelated diseases of the skin, and his experience will on occasion have to be the deciding factor as to whether or not this case is one which justifies compensation.

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Modern Methods of Tuberculosis Control

THE crux of tuberculosis control is first, to find the cases and, second, to properly supervise cases and contacts so as to prevent further spread of infection. There are a number of demonstrated techniques in case finding that, if adequately applied, would uncover all cases. However, appropriations for the widespread application of these principles are limited, and there is always a certain amount of resistance from the individual.

The most fertile field for case finding is among contacts to known cases and deaths. Generally speaking, the more serious the lesion the greater the danger for contacts. Special attention should be given to adolescent and adult groups, for it is in these age periods that we find our greatest mortality and morbidity.

When known contacts are adequately supervised, and there is no community where this field is completely covered, consideration should be given to the remaining population. It is from this group that many entirely new cases are reported. It is neither possible nor necessary to reach the entire non-contact population. Here again we may apply our knowledge of the prevalence of tuberculosis as expressed by sex, age, racial groups, and occupation.

Widespread surveys among non-contact groups, such as routine tuberculosis testing or x-raying of grade school children, have a great educational value, but if used as a method of finding new cases of clinical disease they do not compare in efficiency to case finding among adolescents and young adults.

One of the biggest parts of anti-tuberculosis work is still the education of the public.—*John L. Rice, M.D., Neighborhood Health, vol. 1, no. 4, 1935.*

The Destruction of Pure Cultures of the Escherichia-Aerobacter Group in Milk Pasteurization*

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HEALTH officers and milk inspectors have been conscious for many years of the need for some laboratory test to detect inefficient pasteurization of market milk and, at the same time, to detect contamination of the milk after pasteurization. Without such a laboratory test it is very difficult to eliminate all danger of inefficient pasteurization. Three types of tests have been developed for this purpose, namely: (*a*) the destruction or weakening of certain enzymes, (*b*) the rate of creaming of diluted milk, and (*c*) the destruction of organisms of the Escherichia-Aerobacter group.

Tests of the first two types do not reveal contamination after pasteurization unless this contamination involves the mixing of appreciable quantities of raw milk with the pasteurized product. They do not, therefore, completely satisfy the needs of dairy bacteriologists, even if they do indicate the heat treatment given to the milk with reasonable accuracy. Many believe that the presumptive test for the Escherichia-Aerobacter group of organisms detects such contamination and also serves to indicate the efficiency of the pasteurizing process.

The Presumptive Test—Methods and Standards

It has long been recognized that in the examination of pasteurized milk by the presumptive test for the Escherichia-Aerobacter group some positive tests are obtained on milk which is believed to have been properly pasteurized. The appearance of these positive presumptive tests has been disconcerting and has made the interpretation of the test difficult. Some of the positive presumptive tests were formerly due to the growth of organisms of some other group, but the introduction of new media such as brilliant-green lactose peptone bile has eliminated most of these. The danger of missing organisms of the Escherichia-Aerobacter group by the use of too high dilutions can be eliminated by the use of 1 ml. of milk in the test as recommended in Standard Methods of Milk Analysis (Provisional Methods). Even when the methods recommended by this Committee are used some positive presumptive tests are obtained and the Committee recommends that "Where more than 10 to 20 per cent of the 1 ml. samples of freshly pasteurized milk give positive results from the bottled milk, either improper pasteurization or contamination of the pasteurized product by organisms of the colon group . . . may be suspected." This is in agreement with the recommendation of McCrady and Langevin. The necessity for such a tolerance greatly detracts from the value of the test as a laboratory procedure since positive tests on the milk of a particular plant must always be followed by a careful inspection of the plant and its methods before one can be satisfied that the milk is safe. The possibility of eliminating these positive presumptive tests by further

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modification of the test medium, and without changing the temperature requirements of pasteurization, would seem to be remote on theoretical grounds.

The Destruction of Pure Cultures in Milk Pasteurization

A study of the destruction of pure cultures of organisms of the Escherichia-Aerobacter group was undertaken to determine the types of organisms which survived. A study of these types, if they were constant in their reactions, might lead to the use of some confirmation test which would indicate whether the positive presumptive test obtained was due to a heat-resistant strain or whether the methods of the plant were at fault. Studies of this type have been undertaken many times but none of them has been successful from the standpoint of developing a confirmation test. So many of the methods of differentiating between strains of the group of organisms in question have been improved in recent years, and so many new methods have been announced for this purpose, that it was considered there was some possibility of the study demonstrating new relationships of interest. A review of the literature on this subject would be too tedious for a meeting of this type, but a list of the important publications used is appended for reference.

EXPERIMENTAL

Source of the Organisms and Method of Isolation

All of the cultures used in this study were isolated from milk supplies submitted to the laboratory for routine examination. In this preliminary examination the presumptive test medium used was lactose broth containing brilliant-green and 2 per cent bile as recommended in "Standard Methods of Milk Analysis". These cultures were then streaked on Levine's eosine methylene blue agar and a colony typical of Escherichia coli on this medium was transferred to an agar slant. In this manner a stock of 75 cultures was accumulated. Each of these cultures was then further purified by plating on Levine's eosine methylene blue agar by the dilution method, the colony most typical of Escherichia coli being selected for transfer each time. This process was repeated three times and is the method ordinarily used in studies of this type for securing pure cultures. Further examination showed, however, that the cultures were still impure and it was necessary to resort to a more exact technique of purification. A survey of the methods available for this purpose indicated that Paine's technique was probably the best that could be used with our laboratory equipment. Each culture was then further purified by this technique.

Types of Cultures Secured

Some of the original cultures were lost during the first purification process outlined above, a few died while being carried in stock and some were discarded because they were not members of the Escherichia-Aerobacter group. Of the original 75 cultures 66 remained after the first purification and 54 after the second purification. Of these 54 there were at least 8 that were still impure. This great difficulty of purifying cultures of the Escherichia-Aerobacter group should be emphasized.

The 46 cultures remaining were classified according to their reaction to the methyl red, Voges-Proskauer (Liefson's modification) and indol (Kovac's method) tests, and also as to their ability to grow on Koser's citrate and the type of growth produced on Levine's eosine methylene blue agar plates. All the cultures were Gram negative rods which fermented lactose with the production of acid and gas. Organisms belonging to 12 different groups were secured and the number in each group is presented in table I, together with comments where necessary.

TABLE I

CULTURAL CHARACTERISTICS OF FORTY-SIX CULTURES OF THE ESCHERICHIA-AEROBACTER GROUP

Group	No.	Indol	Methyl red	Voges-Proskauer	Citrate	
I	14	+	+	−	−	Three did not show a metallic sheen on Levine's medium, one liquefied gelatine, and three fermented sodium malonate.
II	10	−	−	+	+	Seven cultures fermented sodium malonate, four liquefied gelatine, and none was typical of Escherichia coli on Levine's medium.
III	8	−	+	−	+	None liquefied gelatine, four fermented sodium malonate, and four were typical of Escherichia coli on Levine's medium.
IV	3	−	−	−	+	None liquefied gelatine, two fermented sodium malonate, and none produced a metallic sheen on Levine's medium.
V	2	+	+	−	+	Neither liquefied gelatine. Results on sodium malonate and Levine's medium inconclusive.
VI	2	−	+	−	−	Did not liquefy gelatine; were typical of Escherichia coli on Levine's medium and one fermented sodium malonate.
VII	2	+	−	+	+	One liquefied gelatine; both fermented sodium malonate. Did not produce a metallic sheen on Levine's medium.
VIII	1	+	+	+	−	Did not liquefy gelatine, did not ferment sodium malonate, and produced no metallic sheen on Levine's medium.
IX	1	−	+	+	−	Did not liquefy gelatine, did not ferment sodium malonate and produced light-coloured colonies with no metallic sheen on Levine's medium.
X	1	+	−	−	−	While not entirely typical of Escherichia coli on Levine's medium, would probably be classified as a member of the colon group. Did not liquefy gelatine and did not ferment sodium malonate.
XI	1	−	−	+	−	Did not ferment sodium malonate, did not liquefy gelatine, and was not typical of Escherichia coli on Levine's medium.
XII	1	−	+	−	+	Did not liquefy gelatine, did not ferment sodium malonate, and would be classified as Escherichia coli on Levine's medium.

Method of Handling Cultures and Determining Resistance to Pasteurization

One loopful of a twelve-hour culture in tryptophane broth was transferred to a tube of sterile skimmed milk and incubated at 37° C. for a period of three hours to allow the organism to become established in the new medium. After this incubation period a Dunham fermentation tube of neutral red lactose peptone broth was inoculated from each skimmed milk tube to prove the presence of the organism in the milk in viable form. The milk tubes were then placed in a thermostatically-controlled constant temperature bath adjusted to maintain a temperature of 144.5+0.2° F. Each tube contained the same amount of milk and thermometers were placed in control tubes. Care was taken not to crowd the bath and to allow the heating water to circulate freely under the impetus of a large agitator. Exactly thirty minutes after the thermometers registered 144.5° F. the tubes were removed from the bath, cooled in running water, and incubated at 37° C. for 12 hours. One loopful from each culture was then inoculated into a Dunham fermentation tube of neutral red lactose peptone broth and these were incubated to test for survival of the organisms. The original milk tubes were also returned to the incubator for several days to check for possible growth.

Results

Pasteurization tests were carried out in the manner described on the 66 cultures obtained after purifying by plating. As already mentioned, it was discovered that some of these were not pure. Of these 66 there were 4 which survived pasteurization. After purifying by Paine's method, however, only one of the 46 apparently pure cultures survived pasteurization. This culture would be classed as typical of Escherichia coli on Levine's eosine methylene blue agar, and belonged to Group 3. It did not liquefy gelatine and did not ferment sodium malonate.

DISCUSSION

These experiments suggest that a decidedly mixed flora may develop in the presumptive test when brilliant green lactose broth containing 2 per cent bile is used as the test medium. Not only may a mixed flora develop in this medium but it may be carried along as a mixed flora for some time—perhaps indefinitely—in stock cultures. Plating out and isolating from well separated colonies, even when repeated three times, is no guarantee of purity of cultures. The organisms which we try to separate by these means are members of one group, the growth requirements of which are so closely related that they appear to have the ability to grow in association, at approximately the same rate, in a variety of media. It should be noted, however, that the contaminant in a number of our cultures was a long rod which obviously did not belong to this group at all. Any kind of confirmatory test involves the expenditure of time and money and is always preceded by a so-called "purification" of the culture. These experiments would indicate that these purification procedures are decidedly haphazard and that the confirmatory tests based thereon are probably of little value for the purpose of testing pasteurization efficiency. Swenarton pointed out that if four out of five presumptive tests were negative one would not be justified in saying that the plant was inefficient. After elaborate purification of the presumptive test material and insisting on a pasteurizing temperature of 144.5° F. for 30 minutes, we could only raise that standard slightly and this would not be worth the time and expense involved. From the practical standpoint the experience of the past five years indicates that the test is valuable but the attempt to make it more clear cut, even with the inclusion of the sodium malonate test, has been no more successful than those of other

workers. It is worth noting that leaks of raw milk into the pasteurized supply have been detected on more than one occasion by the use of the presumptive test.

Paine's method of purification, while an improvement over ordinary dilution plating, is not very satisfactory. In the first place it is not as positive as one would wish, and in the second place the contaminant was isolated by this procedure on a number of occasions instead of the organism desired. This is very likely to happen when working with small organisms of nearly the same microscopic appearance.

In these experiments a temperature of 144.5° F. was used under carefully controlled conditions. This temperature is probably slightly higher than the average heat treatment used in the commercial pasteurization of milk in some cities.

The cultures used were heated in milk although all the milk tubes used were not from the same batch of milk. Esty has stated that some variation in the thermal death time of an organism will always be found due to differences in the resistance of different strains, to differences in the composition (particularly the pH) of the medium, to the number of organisms introduced, the age of the organisms and the degree of clumping. In a single test it is difficult to take all these factors into consideration but in the work herein reported the age of the cultures at the time of testing was uniform and the medium and methods used were uniform also. It should be pointed out, however, that in commercial milk the organisms of the Escherichia-Aerobacter group present might vary widely in "maturity" and some of them might possess a different degree of resistance to heat than the three-hour cultures of the corresponding strain as used in this work. The results must, therefore, be interpreted carefully.

One would conclude from this work that if a bacterial survival test is to be used as an indicator of efficient pasteurization some organism having the following characteristics must be used: (*a*) It must be present in bulk raw milk; (*b*) it must be destroyed by heating to 145° F. for 30 minutes; (*c*) it must not be destroyed if the temperature of pasteurization is much below 145° F.; and (*d*) it must be readily and surely detectable if present. To find such an organism in milk would appear to be a hopeless task, particularly in the light of present knowledge of variability of thermal death time with varying conditions. The Escherichia-Aerobacter group probably satisfies the requirements as nearly as any organism is likely to do. Years of experience with tests for these organisms in many laboratories would indicate that the test should be applied to pasteurized milk but there is need of more uniformity in the interpretation of the results. There seems to be no immediate prospect of improving our present method of interpretation.

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AN OUTBREAK OF TRICHINIASIS

TWO reports concerning the occurrence of trichiniasis in Montreal, one by Dr. J. C. Meakins, Physician-in-Chief to the Royal Victoria Hospital, and the other by Dr. J. H. Gervais, Superintendent of the Contagious Diseases Division, have been presented recently to the Department of Health and the essential findings made public by Dr. S. Boucher, Director of the Department.

A year ago, in January, six cases were reported. No further cases were found until October and during the following eight or nine weeks sixty-eight cases were discovered. Among the six cases in January one death occurred, in a child eight years of age. Careful examination of sources of meat used by the affected families in both the January and the October-November outbreaks did not reveal any infected meat. As is well known, the source of infection usually is from fresh pork, ham, or other hog meat, as the hog is the only susceptible animal which is used for human food. The parasites present in meat are liberated in the human intestine and grow rapidly, passing shortly into the blood stream and lodging in the muscles, where they become encysted. In this state the parasites remain in the muscles for the patient's life-time, gradually becoming calcified. The symptoms in man depend on the number of parasites present and include oedema of the eyes and face, with haemorrhages into the conjunctivae, chills and fever accompanied by distressing muscular pains, and, in serious cases, difficulty in breathing due to the involement of the diaphragm.

Minor outbreaks have occurred in the United States and Canada. These have chiefly concerned persons who have eaten home-killed pork inadequately cooked or in an uncooked state such as in certain types of sausage. Experimental work has shown that freezing is not effective in killing the parasite unless a temperature of $-35°C.$ is attained and held for at least two hours. An efficient system of meat inspection as ordinarily conducted in this country can detect only heavy infections of trichina larvae. Sparse infections are seldom discovered, as microscopic examination of meat is required.

Protection against this infection is afforded by the thorough cooking of all forms of pork. It is essential, however, that the cooking be thoroughly done. Boiling is most effective, requiring thirty minutes for each two pounds of meat. Roasting is less satisfactory, as the central area may be insufficiently cooked. To a great extent, therefore, the individual householder may safeguard himself and his family not only from this infection but from all types of such transmissable diseases by the proper cooking of meats. The occurrence of these outbreaks serves as a reminder of those diseases which may be transmitted to man through food. Constant vigilance on the part of Departments of Health and physicians is necessary, together with the continuous education of the public in the methods of safeguarding health.

ATMOSPHERIC POLLUTION

INTERESTING experimental work has recently been reported by Barrett in the School of Hygiene, University of Toronto, as part of a general study on atmospheric pollution. The experiments were undertaken with a view to determining whether smoke in concentrations ordinarily occurring in urban centres diminished the intensity of ultra-violet energy in sunshine to an extent where its prophylactic action on rickets was significantly affected.

Albino rats fed on a rachitic diet were exposed to the radiation of a quartz arc lamp. The radiation traversed a layer of smoke of known concentration. The degree of rickets that developed in the animals was determined by roentgenograms and bone ash analyses. The findings showed that the level of calcification that occurred in animals irradiated through smoke was significantly lower than that which occurred when the smoke layer was not interposed. A good correlation between the conditions maintained in the artificial, controlled experiment and those normally found in urban atmospheres was found to exist. Although it is realized that there may be other physiological reactions influenced by other portions of the sun's spectrum, the prophylactic and therapeutic action on rickets of a narrow band in the short ultra-violet region is at present the only measurable effect. The work so far completed indicates that smoke in concentrations in which it ordinarily occurs can cause a diminution in the ultra-violet intensity of sunshine to a degree where its power to prevent rickets in rats is considerably diminished.

The economic loss occasioned by smoke pollution is well recognized. The effect of smoke pollution on the health of a community is not definitely known, but such studies indicate that the pollution of air with smoke may be an important health hazard in the larger cities. It is essential that surmise and assumption be replaced by facts demonstrated by scientific observations.

LABORATORY SECTION

THE INCIDENCE OF THE BOVINE BACILLUS IN LESIONS FOUND IN MAN*

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THIS investigation was carried out to ascertain the extent of bovine infection occurring in various lesions in man representing a cross-section of the urban and rural population of Ontario.

The majority of the strains were obtained as pure cultures of the tubercle bacillus from Dr. A. L. MacNabb, Director of the Division of Laboratories, Ontario Department of Health. In the isolation of these strains both the cultural and guinea-pig inoculation methods were employed with all specimens except sputum. The cultural method alone was used for the isolation of tubercle bacilli from sputum. Several special media were used, Lowenstein's being found to be the most suitable, and the cultural method was shown to be as reliable for the isolation of the tubercle bacillus as the guinea-pig method.[1, 2] The original specimens had been forwarded from various parts of Ontario to the Central laboratory for routine diagnosis and were chiefly from adults. The remainder of the specimens comprising most of the spinal fluid group, came from the wards of the Hospital for Sick Children, Toronto.

Method of Typing

The cultural and morphological characteristics of each strain were noted but, as has been the common experience, afforded little information of value in distinguishing the types of tubercle bacilli. In each instance a pure culture of the strain to be typed was used. A weighed amount of the moist culture was triturated in an agate mortar, taken up in saline, and diluted so that 0.01 mgm. was contained in each cubic centimetre of diluent. Rabbits were injected intravenously and received 0.01 mgm. of moist culture in 1 cc. of saline. The rabbits were kept under observation for a maximum of four months. A thorough autopsy was performed on each animal and the usual criteria of extensive pulmonary tuberculosis with or without glandular and peritoneal involvement were accepted as evidence of the bovine type of tubercle bacillus. The results obtained are given in table I.

TABLE I

Source	Human	Bovine
Urine	66	2
Abscess	12	0
Pleural fluid and empyema	44	0
Pus (from leg, sternum, rib, scapula, etc.)	17	0
Cervical glands	8	1
Sputum	24	0
Psoas and lumbar abscess	13	1
Synovial fluid	7	0
Spinal fluid	39	4
Ascitic fluid	1	0
Parietal bone	1	0
Rectal abscess	1	0
Total	233	8
Percentage	96.68	3.32

The low incidence, 3.32 per cent, of the bovine type of tubercle bacillus

*Presented at the Annual Meeting of the Royal Society of Canada, Section V, Subsection of Medical Sciences, Hamilton, Ontario, May 24, 1935.

is of interest. Material for examination was received from widely distant parts of the province of Ontario as well as the central areas, including both rural and urban population. A total of 241 strains was isolated. Sources of the material included sputum, urine; spinal, synovial and ascitic fluids; pleural fluid; and pus from various areas of the body, and cervical glands. The bovine type was not isolated from any specimen coming from the respiratory system, that is, sputum, pleural and empyema fluids. The spinal fluid yielded the largest number of the bovine type of any particular source. From four out of thirty-nine spinal fluid specimens, or 10.2 per cent, bovine tubercle bacilli were isolated. Griffith[3] reported the incidence in England of bovine tubercle bacilli in spinal fluid as 30.2 per cent. The strains of the bovine type isolated from pus were from cervical gland and psoas abscess respectively.

SUMMARY

1. From a total of 241 strains of tubercle bacilli isolated from various lesions in man residing in various parts of the province of Ontario, 233 or 96.68 per cent were the human type and 8 or 3.32 per cent were the bovine type.

2. The highest incidence of the bovine type occurred in strains isolated from spinal fluid, 10.2 per cent being the bovine type.

3. In no instance was the bovine type isolated from the pulmonary system.

ACKNOWLEDGMENT

The technical assistance of Mr. A. J. Bishop in the performance of this work is acknowledged.

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REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES—DECEMBER, 1935

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria	—	6	26	126	49	16	10	1	2
Scarlet Fever	—	51	16	588	1085	164	72	114	116
Measles	12	106	234	691	3278	257	535	150	741
Whooping Cough	3	111	6	403	767	85	123	6	14
German Measles	—	6	—	475	618	14	693	1	258
Mumps	—	114	—	127	1274	393	1549	21	397
Smallpox	—	—	—	—	—	—	—	—	3
Cerebrospinal Meningitis	—	—	—	3	3	1	—	—	1
Anterior Poliomyelitis	—	—	—	3	1	1	1	3	—
Typhoid Fever	1	—	7	103	16	3	—	—	3
Trachoma	—	—	—	—	—	1	1	—	11

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

MENTAL HYGIENE

MENTAL HYGIENE IN CANADA DURING THE DEPRESSION

THE following review of the progress of mental hygiene in Canada during the period of the depression has been contributed by the Canadian National Committee for Mental Hygiene.

The difficulty of providing public funds for mental hygiene services has inevitably resulted in some letdown in these services in some parts of the country. Plans were being made to provide improvements in institutions, to train workers, and to extend mental hospital services in the community. In spite of difficulties it is possible to point to achievement in nearly every province and to look forward to the working-out of progressive programs.

Western Provinces

In British Columbia, under the direction of the Honourable Dr. Weir, a better integration of mental hygiene into the public health and social welfare services of the province has been achieved. The appointment, on April 1, 1935, of Dr. A. L. Crease to the positions of General Superintendent of Mental Hospitals and Provincial Psychiatrist is a source of great satisfaction. Both Dr. Crease and British Columbia are to be congratulated. The new appointee combines to an unusual degree great organizing ability with an admirable point of view. He has already instituted a course of lectures on mental hygiene to the teachers-in-training at the Provincial Normal School and to the Health and Social Service group at the University of British Columbia. The clinics in Vancouver have been extended to two full days a week, and an adult clinic along similar lines to the Child Guidance Clinic and clinics for the follow-up of probation and syphilitic cases are being opened. Arrangements are being made to start a clinic at Chilliwack to serve the Fraser Valley District and it is hoped to have an adult clinic in Victoria.

In Alberta, under the leadership of Dr. Baragar, Commissioner of Mental Institutions and Director of Mental Health, there have been certain developments. In 1933 the Provincial Auxiliary Mental Hospital was opened at Claresholm in the southern part of the province to take care of the overflow of female patients from Ponoka. Quarterly mental health clinics have been established in Medicine Hat and Drumheller and a series of five clinics through the Peace River country was instituted in the fall of 1934. In the same year affiliation was arranged with six of the leading general hospitals of the province so that mental hospital nurses now obtain full recognition after a four years' course of training. In addition, the course in psychiatry for medical students of the University of Alberta has been greatly strengthened and now compares most favorably with any other Canadian medical school. Students in their final year now spend two weeks in residence at the Provincial Mental Hospital where they work up cases, attend staff conferences and are given a series of clinical demonstrations.

In Saskatchewan additional accommodation for about 120 patients has been provided at North Battleford.

Systematic instruction in mental hygiene of the public health staff of Manitoba has been carried out. In September Dr. Mitchell of the Montreal Mental Hygiene Institute participated with Drs. Musgrove and Adamson in a refresher medical course at the University of Manitoba. One morning was given over to a sym-

posium dealing with the mental health aspects of general medical practice and afternoon lectures were given to the public health nursing group. The sessions were well attended and keen interest was displayed.

PROGRESS IN ONTARIO

Several changes and additions have been made in the Ontario mental hospitals. New building at Orillia permits the accommodation of some 500 additional patients and the hospital at Cobourg is in process of being made into a training school for higher grade mentally defective girls. Considerable additions have been effected in the hospitals at Woodstock, Mimico and London, while a new building at Penetang accommodating 150 patients is now utilized for the criminal insane of the province.

Perhaps the most interesting development in mental hygiene in Ontario, or indeed in Canada, is the use of the boarding-out system instituted for patients within the last few years. Altogether there have been 782 patients boarded out and there are at the present time 388.

Another substantial advance is the new Ontario Mental Hospitals Act. To touch upon only a few of its features, it provides for easier and more direct admission of patients and eliminates the possibility of patients being detained in gaols prior to admission; it aims at a closer relationship between mental hospitals and physicians; it provides by statute for mental health clinics; and it contains provisions under which magistrates may remand persons to a mental hospital up to 60 days for observation and report as to mental condition.

The Ontario Mental Health Clinics have gradually extended their services and now radiate from 8 mental hospitals. The last published report (1933) shows 3,335 new cases for that year.

The above developments in Ontario are those of the government under the leadership of Dr. B. T. McGhie, Deputy Minister of Health and Hospitals.

QUEBEC AND THE MARITIMES

St. Jean de Dieu Hospital at Montreal has been enlarged by an addition capable of accommodating 600 to 700 patients. The mental examination of the Montreal school children is proceeding; 3,354 were examined in the school year 1934-35 and progress has been made in the provision of special classes for retarded children. A survey of the federated charities of Montreal, recently completed, indicates how thoroughly the Mental Hygiene Institute has succeeded in having mental hygiene established as an essential and integral part of the work of the social services and the voluntary health agencies of that city.

Dr. E. C. Menzies, formerly Assistant Superintendent of the Verdun Protestant Hospital, has been appointed Medical Superintendent of the New Brunswick Mental Hospital and has effected a reorganization. An additional junior physician is to be added to the staff.

In Prince Edward Island the reconstruction of the Falconwood Hospital has progressed to the completion of one unit and the position of mental hygiene in that province has been greatly strengthened by the appointment of a qualified psychiatrist in the person of Dr. Murchison.

PLANS, PROGRAMS, AND PROGRESS

IT has been suggested that medical officers of health and other members of health departments would appreciate learning of the activities of the many excellent local departments throughout Canada. Such activities are seldom recorded in formal articles and it is hoped that the contributions may be more or less informal, recording subjects such as immunization, new enactments, the conduct of school medical inspection, health education, public health nursing, and sanitation. Suggestions and contributions are cordially invited and should be addressed to the Editorial Board.

How We Obtained Immunization of a High Percentage of School Children in South Dumfries Township, Ontario.

I BELIEVE that the organization under which I am working as a part-time medical officer of health is more or less unique in Ontario. Three closely related municipalities, namely South Dumfries township, North Dumfries township, and the village of Ayr in the latter, with a combined population of 5,800, co-operated in 1929 to provide a "Health Nurse Association". This association consists of the medical officers of health and the reeves of the three municipalities. One of the municipal clerks serves as the secretary-treasurer. The success of the plan was due in no small measure to the interest of Dr. Ward Woolner, past president of the Ontario Health Officers' Association, who, as medical officer of health of Ayr, joined heartily in the effort. Miss Clara Forbes was engaged to work throughout the district and it is my desire to record briefly the success of this plan.

The district contains twenty-two public schools, one of which has four classes and another three, making a total of twenty-seven classrooms which are visited at least once a month. The total enrolment of pupils is 630.

Dr. Woolner and I began the administration of toxoid in the schools in 1928 without the assistance of a nurse and our records show that less than 50 per cent of the pupils' parents gave their consent to immunization. To-day as a result of a great deal of groundwork performed by our nurse, we have 92 per cent of our school children immunized and a large percentage of preschool children as well. Our nurse, as you may know, has been busy and accomplishes most results through the schools.

We find October and November to be the best months to administer toxoid. In September the nurse makes a note of any new pupils who have not been immunized against diphtheria. She is also informed by the teacher of any preschool children residing in the section. She then makes house-to-house calls in order to arouse the interest of the parents. She never neglects to take along a consent form. These we used to have printed at the expense of the local board of health but now they may be secured gratis on application to the department. The parents are notified as to when the medical officer of health will be at the school to administer toxoid and are impressed with the necessity of either signing the consent form or being at the school when the first dose is administered. The response has been splendid. *We have not had a single case of diphtheria in our district during the past five years.* Parents, aware of this fact, are convinced that we are doing something worth while and are not only willing but anxious to have their children protected. During the past two or three years it has been a very rare occurrence to meet an objector.

The same procedure is followed in each school during the nurse's monthly visit. We set aside usually

two afternoons for the administration of toxoid. The approximate time of arrival at each school has been announced previously and the work takes surprisingly little time. The nurse arranges the children in line, paints an area on the arm of each with iodine, and the whole procedure of immunization is soon over. I have never made an actual count but I am sure that twenty children are treated in not more than ten minutes. I have never given toxoid to a child younger than eight months or older than thirteen years. The use of the reaction test is necessary in immunizing older children but with our plan of reaching the preschool children it is seldom that we now find a child over seven years of age who has not been immunized.

If because of sickness or any other reason, a child is unable to be present on the day we visit the school, the nurse arranges to have him come to my office within forty-eight hours. We try to impress on parents that in order to obtain the desired result the procedure must correspond with the schedule which we arrange.

I have attempted thus far to explain how we reach the parents through the schools. There is another very important organization through which we work and it certainly should be utilized in any campaign where the health of the children is concerned. I refer to the Women's Institute. I think every township has one; South Dumfries boasts three. We ascertain the date and the place of each September meeting and experience no difficulty in getting ten or fifteen minutes of their program time allotted to us. In fact, we have always found them not only willing but anxious to co-operate with us in any health work. If we are having a toxoid campaign either Miss Forbes or I appear at the meeting and give a few minutes' talk on the prevention of disease, stressing the one that we have in mind to combat the following month. We always have a supply of consent cards with place and date filled in, which we ask the ladies to sign and leave with the hostess. This procedure is also carried out prior to a campaign of vaccination against smallpox. I am not aware that the department supplies a consent card for vaccination, but we have our own printed at small cost to the municipality.

Now a few words regarding results obtained in vaccination. In 1929, prior to the engagement of our nurse, a survey of North Dumfries township revealed the fact that only 29 per cent of school children had been successfully vaccinated against smallpox. A similar survey in South Dumfries township showed 54 per cent successfully vaccinated, the much larger percentage being due to an outbreak of smallpox earlier that year in the village of St. George. Within forty-eight hours after discovery of the first case, I had vaccinated eighty-three persons, mostly children. In 1933, Dr. Woolner vaccinated 226 school children with a successful result in every case except one. A survey in his township in 1934 showed 90 per cent successfully vaccinated, an increase of 61 per cent during the five years in which we have had a nurse. This is a better result than I obtained. In 1932 I vaccinated 145, of which 137 were successful. Our survey in 1934 showed 86 per cent of school children protected against the disease. Our smallpox prevention campaign is carried out along the same line as that against diphtheria.

I am sure that many health officers in a rural community, especially if they have not been over-enthusiastic regarding vaccination, would not only be surprised but shocked were a survey made showing just how many persons there were in their district with no protection against smallpox. The general public has learned to appreciate what has been done to stamp out diphtheria, which makes it so much easier to get consent for immunization against other diseases. I admit having done very little active immunization against scarlet fever. The five injections make much extra

work for a part-time medical officer of health in a rural section. However, the matter will receive further consideration in view of the increasing number of favourable reports.

The results obtained, I believe, are a strong argument in favour of a district nurse, even though a couple of townships may be compelled to engage one jointly for financial reasons. Very few part-time medical officers of health can afford sufficient time from private practice to carry out an immunization campaign successfully without the assistance of a district nurse. Under the system outlined I find that each yearly toxoid campaign requires less than twenty hours of my time.—*E. J. Gordon, M.D., C.M., Medical Officer of Health for South Dumfries township, St. George, Ontario.*

MEDICAL RELIEF IN ONTARIO

FOR the period of six months from March 1, 1935, an interesting analysis has been made by the Ontario Medical Association, which is responsible for the administration of medical relief in the province. In accordance with this plan the Provincial Government pays 25 cents per month for each individual receiving municipal relief. During the period approximately 3,000 doctors participated, their accounts being received and payments made through 96 medical relief committees. The total amount of physicians' accounts rendered to the medical relief committees was $1,278,596.00. The amount received from the province was sufficient to pay to the physicians $557,446.00, representing 43.6 per cent of the amount of the accounts, including drugs. The total number of patients receiving treatment was 278,503. The gross cost per patient was $4.59. The net paid per patient to physician, including drugs, was $2.00 and the average number of patients per doctor was 18.2. The average net paid per office call, including drugs, was 85 cents and per house call, $1.25. The net amount for confinement, including drugs and supplies, was $10.75. The average cost per druggist's prescription was 37 cents.

The complete analysis will be of great value in discussing future plans relating to medical relief.

Mental Hygiene REAPPEARS

SOME three years ago the Canadian National Committee for Mental Hygiene discontinued the publication of *Mental Health*. Since that time the group in Montreal under the leadership of Dr. W. T. B. Mitchell, Mrs. Mitchell, and Dr. B. Silverman have published the Montreal *Mental Health*. The reappearance of *Mental Health* is the result of the demand for a publication containing material of an educational and news nature relating to the whole of Canada. The bulletin will be published quarterly and the second number will appear early in February. The mailing list is being revised and new names will gladly be added if the request is made to the Canadian National Committee for Mental Hygiene, 111 St. George Street, Toronto.

ACTIVE IMMUNIZATION AGAINST SCARLET FEVER IN SWIFT CURRENT, SASKATCHEWAN

DURING the past seven years we have carried out inoculations in the schools against scarlet fever as well as against diphtheria and smallpox. In scarlet fever immunization we have used five doses of scarlet fever toxin. During this time there has been one case of scarlet fever in a child who had received four immunizing doses the year previously. A second case where a brother had a definite attack (but who was not immunized) developed a fever and a very suspicious throat with slightly enlarged cervical glands, but no rash. There were at least three other cases which developed scarlet fever, and it was reported that they had been immunized but from my records I could not prove that they were or were not.

No deaths occurred among these few cases which developed scarlet fever but we have had one or two

deaths among those who had not been protected. I feel that scarlet fever immunization is extremely valuable but not as efficient as diphtheria toxoid. We have had no very serious reactions following the administration of scarlet fever toxin.

During the seven years 1929-35, the total number of children receiving scarlet fever toxin (5 doses) was 1,082, while during the six-year period, 1930-35, the number receiving diphtheria toxoid (3 doses) was 1,110, as presented in the following table. The

Year	*No. Immunized against Scarlet Fever*	*No. Immunized against Diphtheria*
1929...	432	
1930...	252	649
1931...	64	65
1932...	42	92
1933...	97	74
1934...	79	118
1935...	116	112
	1,082	1,110

population of Swift Current, according to the 1931 census, was 5,296, with 1,606 in the age-group 0 to 15 years.—*H. C. Burroughs, M.D., Medical Officer of Health.*

OTTAWA'S ANNUAL REPORT

ONE of the striking features of the annual report by Dr. T. A. Lomer relates to diphtheria. During 1935 there were 37 cases of diphtheria with one death. The single death occurred near the end of the year, breaking a record of 19 months without a death from this disease. The result is attributed to the educational campaign commenced in 1931 which has been actively continued through newspapers, lectures, the liberal distribution of literature by the district nurses, and through the schools. Radio talks also have been given frequently. Toxoid clinics were held in the schools, both public and separate, with the consent of the school boards, offering immunization to all children in the kindergarten and in the first and second grades. There were 278 clinics in the schools. A total of 2,226 received the full protective treatment while 1,335 were under treatment at the end of the year. The following table shows the progress of diphtheria prevention since 1931:

Year	*Cases*	*Deaths*
1930.....	626	26
1931.....	553	11
1932.....	343	11
1933.....	111	4
1934.....	66	1
1935.....	37	1

The report points out also that the tuberculosis death rate was the lowest recorded for the city, being 34.9 per 100,000. The infant mortality rate was 87.6 per 1,000 live births, being higher than for the years immediately preceding, namely, 84.8 in 1933 and 76.6 in 1932. In 1931 the rate was 90.1. The birth rate showed a significant increase from 20.69 per 1,000 population to 21.8.

APPOINTMENTS

DR. W. Egerton George, D.P.H., formerly District Medical Officer of Health, Ontario, was recently appointed Medical Officer of Health for Galt, Ontario, succeeding Dr. J. H. Radford, retired.

Dr. A. L. Crease has been appointed General Superintendent of Mental Hospitals and Provincial Psychiatrist for British Columbia.

ASSOCIATION NEWS

Committee on Housing

AT a recent meeting of the Executive Committee, a Committee on Housing was appointed and announcement made that Dr. R. St. J. Macdonald, Professor of Public Health and Preventive Medicine, McGill University, had accepted the chairmanship, and that Dr. L. A. Pequegnat, Deputy Medical Officer of Health, Department of Public Health, Toronto, would act as secretary. Dr. Macdonald's interest in housing is well known. He has contributed a number of important articles, the most recent being published in the October, 1935, issue of the National Health Review.

The committee will be national, with corresponding members from all parts of Canada, and a report on health and housing, with particular reference to the medical officer of health, will be presented at the annual meeting in June.

Committee on Qualifications, Duties and Remuneration of the Medical Officer of Health

THIS important committee of the Association, which was constituted following the annual meeting in Toronto last June, has, as the name indicates, a broad commission. Its report will be looked forward to with great interest.

At several annual meetings attention has been drawn to the unsatisfactory position of medical officers of health in regard to their remuneration by the municipalities who receive their services. There are but few full-time medical officers of health in Canada. In contrast, there are approximately 1,900 part-time medical officers, for every municipality is required to have a medical officer. In any consideration of this question there must be consideration of the widely differing conditions under which the service is rendered, varying as these do according to the size of the municipality, whether rural or urban, and varying also with its location in Canada. No uniform plan of remuneration applicable to every municipality is possible. The committee hope to investigate the possibilities of remuneration, keeping in view such factors as have been mentioned, and possibly some plan of payment on a per caput basis may be evolved.

The chairman of the committee, Dr. J. E. Davey, who as Assistant Medical Officer of Health and Director of Medical Services of the city of Hamilton has had wide experience in administrative problems, will welcome correspondence with suggestions in order that the report may be as representative as possible of the varied opinions in regard to the qualifications, duties and remuneration of medical officers of health.

Conference on Vital Statistics

A CONFERENCE is being held by the Section of Vital Statistics in the latter part of April to receive a report of the Committee on the Certification of Causes of Death presenting suggested changes in the International List of Causes of Death. The fifth decennial revision of the International List will be made in 1939 at a conference attended by representatives of the various countries. Prior to this meeting several important preliminary conferences will be held. The first of these will be convened next summer.

The Committee on the Certification of Causes of Death, on the invitation of the Dominion Bureau of Statistics, has made a careful study of the List and it is for the purpose of considering these suggestions that the conference in Toronto is being held. The suggestions, if approved, will be forwarded to the Dominion Bureau for their consideration and possible inclusion in those which will be

presented to the International Commission. This committee of the Association is working in close co-operation with the committee of the American Public Health Association, which has already presented its recommendations.

The conference will give the opportunity also of reviewing the reception of the new Canadian death certificate and other matters pertinent to registration. Detailed announcement will be made in the March issue.

PROGRESS IN ANNUAL REPORTS

MEDICAL officers of health of the cities and the larger towns in Canada have received from the Committee on the Annual Report of the Medical Officer of Health copies of a suggested form for the presentation of vital statistics. The form of this section of the report was carefully considered by the committee and the present forms were prepared with the assistance of other members of the Section of Vital Statistics and the hearty co-operation of a number of medical officers of health.

It was with some trepidation that the committee sent these forms to the medical officers because the members appreciated that, with the exception of those in the larger cities, medical officers serving in a part-time capacity have little opportunity to prepare statistical data. It was, however, their opinion that after the initial work the forms would be time-saving and would give to the health officer an actual picture of the health conditions of his municipality. Thus the statistical section of the report is the very foundation on which an effective report is made. The committee reiterate that the annual health report can be of profit to the health officer by gaining for him a larger measure of public support.

The response has been gratifying and a number of letters have been received, with copies of excellent reports, by the chairman, Dr. D. V. Currey, Medical Officer of Health, St. Catharines. It is planned to review a number of these reports in the JOURNAL and to discuss the comments made by medical officers on the use of these forms and their experience with annual reports.

CERTIFICATION OF SANITARY INSPECTORS

ANNOUNCEMENT of the results of the first examinations for the certification of sanitary inspectors in Canada was made on January 6th. These examinations were held in three provincial centres on December 11, 12 and 13, 1935. The following candidates were successful, having met all the requirements of the examination:

Mr. Stanley Fairhurst, Provincial Board of Health, Victoria, B.C.
Mr. Thomas Henry Jackson, Department of Public Health, Toronto.
Mr. Alexander Williams McDonald, Department of Public Health, Toronto.
Mr. Arthur C. Pettipas, City Health Board, Halifax, N.S.
Mr. Jacob Edward Weis, Board of Health, Stratford, Ont.

In addition to the candidates who sat for the examination, the following holders of the Certificate of the Royal Sanitary Institute or other acceptable qualification were granted certification without examination:

Mr. Arthur Dicaire, Bureau of Health, Lachine, Que.
Mr. Hugh Jamieson, City Health Department, Swift Current, Sask.
Mr. Alexander McCulloch, Building Department, Vancouver, B.C.
Mr. Alexander Stuart O'Hara, Provincial Department of Health, Sioux Lookout, Ont.
Mr. Edgar Gilbert Southon, Provincial Department of Health, Swift Current, Sask.

The interest of these members who already hold an approved certificate is appreciated by the National Committee as tangible evidence of the

desire of those holding such certificates in Canada to establish the new Canadian certificate.

Owing to the short time elapsing between the first notice of the holding of the examinations and the date of the examinations the number of candidates was necessarily small. Careful consideration has been given in selecting the date for the next examinations. Although it was realized that there might be some advantage to candidates to have the examinations held in the spring after they have completed their studies during the winter months, it was not possible to arrange the next examinations at this time. Moreover, definite preference was expressed for the holding of the examinations at the close of the summer season when necessary field work for those who have not had experience in sanitary inspection might be obtained. The time, therefore, selected for the 1936 examinations is the month of September. Announcement of the exact dates will be made after the meeting of the Central Board in Toronto this month. Attending the meeting will be Dr. J. A. Baudouin, University of Montreal; Dr. J. G. Cunningham, Ontario Department of Health, Toronto; Dr. R. D. Defries, University of Toronto; Dr. D. T. Fraser, University of Toronto; Dr. R. St. J. Macdonald, McGill University; Mr. A. S. O'Hara, Vice-president, Canadian Institute of Sanitary Inspectors, Sioux Lookout, Ont.; Dr. J. T. Phair, General Secretary of the Association; and Mr. Percy Pickering, President, Canadian Institute of Sanitary Inspectors, Winnipeg.

AUDITED CIRCULATION FOR 1935

FOLLOWING the policy of the Editorial Board since its appointment in 1928 when the publication of the JOURNAL was assumed by the Association, the circulation records have been audited annually and a statement prepared by Price, Waterhouse and Company, Chartered Accountants. It is indeed gratifying that, in the face of shrinking budgets of health departments and health workers, the circulation has shown substantial increases each year. In 1927 the circulation was approximately 1,400. According to the audited statement for the year ending December, 1935, the average number of copies distributed per issue was 3,129. This represents an increase of approximately 5 per cent over the figure for 1934 and more than double the circulation when the Association assumed responsibility for the JOURNAL'S publication.

THE COMING ANNUAL MEETING IN VANCOUVER, WEEK OF JUNE 22ND

VANCOUVER'S Jubilee Year will be marked by many special features. The civic authorities are making plans which will add greatly to the success of the various national associations which have arranged to hold their annual conventions in that city during the next few months. The Canadian Public Health Association is indeed fortunate that arrangements were made at an early date for the holding of the twenty-fifth annual meeting in Hotel Vancouver during the week of June 22nd. Joining with the Association in the meeting will be the Canadian Tuberculosis Association and the Western Branch of the American Public Health Association. A week of meetings of exceptional interest is thus made possible, affording the opportunity to meet the leading health workers of the whole Pacific Coast. Important programs of health work are being conducted in tuberculosis control under the enthusiastic leadership of Dr. W. H. Hatfield and in mental hygiene under Dr. A. L. Crease. Visiting members will be cordially welcomed to study the highly effective organization of the city department of health Dr. J. W. McIntosh. A feature of the convention will be the visit to Victoria at the invitation of the Hon. Dr. Weir where a special program is being provided by Dr. H. E. Young, Past President of the Canadian

Public Health Association and President of the Western Branch of the American Public Health Association.

As announced in this issue, the headquarters will be Hotel Vancouver and it is suggested that members learn of the attractive railway routings available and make early reservation with the hotel, as accommodation will be at a premium owing to the large number of visitors to Vancouver at the time of the convention.

APPOINTMENT OF THE HON. CHARLES GAVAN POWER, B.A., LL.L., AS MINISTER OF PENSIONS AND NATIONAL HEALTH, CANADA

THE Hon. Charles G. Power, who has been named Minister of Pensions and National Health for Canada, is a son of the province of Quebec. He was born in Sillery, Quebec, in 1888 and received his early education in Loyola College, Montreal. He was graduated in Arts from Laval University in 1907 and subsequently studied law at Laval University, Quebec, receiving the degree of LL.L. In 1910 he was called to the Bar. With the outbreak of the war he enlisted, shortly proceeding overseas. Twice wounded, he was invalided from service in 1918, having the rank of Captain and Acting Major. He was awarded the Military Cross for distinguished service.

The Hon. Mr. Power was elected to the House of Commons in the general election of 1917 as member for Quebec South and was re-elected in 1921, 1925, 1926, 1930, and 1935. His appointment as Minister of Pensions and National Health has been received with great appreciation by returned soldiers throughout Canada as he has consistently and effectively presented their problems in Parliament. In addition to having an intimate knowledge of all matters associated with pensions, he is particularly well informed on public health objectives and the importance of health as a national asset. As Minister of National Health he brings

Hon. Charles Gavan Power

to this office the same enthusiasm and zeal which have characterized his efforts for the welfare of those who served in the overseas forces of Canada.

BOOKS AND REPORTS

Recording of Local Health Work. *By W. F. Walker and C. R. Randolph in co-operation with the Committee on Administrative Practice of the American Public Health Association. Published by the Commonwealth Fund, 41 East 57th Street, New York. 269 pages. Price $2.00.*

In order to fulfil properly his obligation to the community, the health officer must have accurate information concerning the incidence of diseases among the population in his area. Furthermore, the local health program cannot be efficient and effective unless those entrusted with it are fully aware of the facts as they concern their own particular group. Frequently these facts can be ascertained only by careful study and in this pursuit of practical data an efficient record system is of first importance.

Any record system is better than none, but the immediate and ultimate value of local health records can be greatly enhanced if they are made in standard form. Every medical statistician and epidemiologist, everyone concerned in the public health field realizes the unfortunate dearth of comparable data on problems of morbidity and mortality. This volume offers a useful, practical system of recording which can be generally adopted for local health work. If such a system were uniformly employed it would yield tremendous dividends to the service of public health and local health officers would be able to study their balance sheet of health in direct comparison with others.

The book gives an excellent presentation of a model record-keeping system. The model records are presented in two groups: (*a*) administrative records, (*b*) service records. Under administrative records are discussed the daily report form, budgets and accounts, and vital statistics including recommended tables. The service records are presented in detail with valuable concise comment and directions. These include the family folder, the individual index card, the essential records as well as laboratory reports, and forms for social and nursing investigations.

A chapter is devoted to proper recording for each of the individual hygiene services. Among these are the maternity service, infant, preschool and school, dental and adult hygiene services. The records suggested for the field of sanitation are well adapted for use by large or small departments and branches of activity dealt with include food, milk and general sanitation.

The book is completed by two valuable chapters, one on preparing and filing the record forms already described and the other on the interpretation of the records. The latter is a frank, simple discussion of the fundamentals in presenting and interpreting local health statistics.

This book presents an outline of practice in recording local health work based on wide experience and careful study. It is a substantial contribution to the ultimate comparability of local health data. A review would be incomplete without an expression of thanks to the authors who, in co-operation with the Committee on Administrative Practice of the American Public Health Association, prepared this volume, and to the Commonwealth Fund for making possible its publication and distribution at such a minimum price.

K. F. Brandon

Poliomyelitis. *By John F. Landon, M.D., and Lawrence W. Smith, M.D. Published by the Macmillans in Canada, St. Martin's House, 70 Bond Street, Toronto. 275 pages with 18 illustrations. Price $3.60.*

Following the 1931 outbreak of poliomyelitis in New York City the authors reviewed 2,400 clinical his-

tories and the autopsy findings in 81 cases, which autopsies of cases occurring in that epidemic were conducted by one of the authors. The book presents the epidemiology of the disease as illustrated in this extensive outbreak. The authors have succeeded in giving a compact and well-rounded description of the disease. Serum treatment is discussed with brief reference to favourable and unfavourable reports of serum therapy, concluding from the experience in this outbreak that the results of serum treatment are inconclusive. The section on after-care of paralysed patients is well presented. One is disappointed, however, to find in this chapter no reference to the results obtained in Australia by Dame Jean Macnamara, who has made very definite contributions to the methods applicable to such cases.

R. D. Defries

Healthful Living. *By Harold S. Diehl, M.D. Published by the McGraw-Hill Book Co. Inc., New York, 1935. Canadian agents, George J. McLeod, Ltd., 266 King Street West, Toronto. 354 pages. Price $2.75.*

This book is the first volume in the Whittlesey House health series under the general editorship of Morris Fishbein. These books are to be written in non-technical language so that a lay person may readily understand and obtain the essential information.

Dr. Diehl is well known not only as one of the pioneers in the organization of university health services but also as the Dean of Medical Sciences of the University of Minnesota and Professor of Preventive Medicine and Public Health. Dr. Diehl writes from a wide experience in dealing with the various problems relating to a healthful, sane mode of living. He has arranged the book in twenty chapters covering a variety of subjects such as the possibilities of longer life and better health, exercise, fatigue, rest, choice of foods, mental health, normal sex-life, digestive disturbances, the common cold, choosing a health adviser, and a number of other equally interesting and important topics. Supplementary data have been included as appendices, together with helpful suggestions as to suitable supplementary readings. The whole book will be of interest and profit to the layman.

If subsequent books in the series maintain the high standard set by this book, they will prove indeed a very useful source of reliable information for the general public.

D. L. MacLean

1935 Year Book of General Medicine. *Edited by Drs. George F. Dick, Lawrason Brown, George R. Minot, William B. Castle, William D. Stroud, and George B. Eusterman. Published by the Year Book Publishers, Inc., 304 South Dearborn Street, Chicago, Ill., 1935. 848 pages. Price $3.00.*

The problem of keeping up-to-date with the constantly changing and advancing front of medical science immediately confronts every graduate, practitioner or otherwise. The difficulty of meeting this problem adequately is all too apparent when one considers the great number of publications, native and foreign, the wealth and variety of articles and the limited time which the individual can devote to their consideration and consumption.

In the opinion of the reviewer the Year Book of General Medicine best meets the situation. The wheat has been carefully separated from the chaff in the various departments of medicine dealt with in this book and the reader is presented with a short, concise account of the most essential literature on each subject. The editorial comments throughout, bearing the stamp of authority, are excellent sign posts in those many instances in which conflicting views are in evidence.

It is impossible in the space of this review to comment adequately upon the many important topics dealt with in this book, and we think it is sufficient to say that the work as a whole deserves unreserved recommendation.

F. O. Wishart

Diseases of the Skin. *By Frank Crozer Knowles, M.D. Published by Messrs. Lea & Febiger, Washington Square, Philadelphia, Pa., 3rd edition, 1935. 640 pages, including 240 engravings and 11 plates. Price $6.50.*

Doctor Knowles has re-edited his book, rewritten certain chapters, and brought the book up-to-date in all phases of the problem of skin diseases. A very suitable starting point is made in the discussion of the anatomy and physiology of the skin, followed by a section dealing with differential diagnosis based on the various signs and symptoms presented by a patient. The greater part of the book, of course, consists of well written accounts of each individual skin disease, its course, symptoms, treatment, etc. An entire chapter is devoted to prescriptions and local and systemic treatment which should be of value to the practitioner.

The book is well written and covers the whole field of dermatology; it contains an index and many illustrations. It could be used as a textbook for medical students and should be particularly useful to any general practitioner who desires to keep abreast of the new developments in dermatology. The author is to be congratulated on his work.

D. L. MacLean

The Administration of Health and Physical Education. *By Jesse Feiring Williams, M.D., and Clifford Lee Brownell. Published by W. B. Saunders Company, Philadelphia and London, 1934. Canadian agents, McAinsh & Co., Limited, 388 Yonge Street, Toronto. 598 pages; 103 illustrations. Cloth, $3.50.*

To-day health and physical education are receiving more attention than ever before. Too often, however, the work of physicians, nurses and physical educationists lacks co-ordination. The purpose of this volume is to "present a unified administrative program in book form and to establish those principles of administrative organization that are practical and in operation."

In twenty-one chapters the authors present as many phases of the administration of health and physical education. Concepts are clearly defined and the origin of the basic principles involved is enunciated. Legal aspects, difficulties, and inter-relationships between central and local governmental bodies are discussed. The true place and significance of the school health service have but recently been clearly seen. Education being conceived as the force concerned with preparation for full and useful life in the community, health and physical education become factors of new and unrivalled importance. Scope, administration and functions of the school health service are reviewed in detail. Handicapped children, health instruction, personnel, environment and courses of study are some of the many other phases of the subject covered by the authors. Chapters on publicity, budget and finance, and office management complete the text.

There is no doubt that this book is one of great practical use. Teachers and teachers-in-training in physical education will find considerable interest in the clear discussion of the many problems to which the text is devoted. From the standpoint of the health officer the book is a most helpful compendium to which he can turn for a presentation of almost every aspect of the subject of school health, including physical education.

A. H. Sellers

CURRENT HEALTH LITERATURE

These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.

Poliomyelitis: History of the Disease and of Research concerning its Epidemiology during Recent Years

This report published by the League of Nations Epidemiological Intelligence Service is presented in two parts. The first part deals with the epidemics which occurred throughout the world in 1934 and 1935, and much detailed information is given. The Scandinavian countries, Germany and the United States recorded the highest number of cases in these two years. In Europe, except for Denmark and Sweden, Germany was the chief focus. In Germany some districts showed a persistence of the disease through several years but areas of high incidence showed a yearly movement and tended to occur in areas least affected in the previous year. The apparent case-fatality rate in 1935 was 8.5 per cent, which was a decline from previous years (10.5 per cent in 1933) and presumably due to better diagnosis of abortive cases. In a large epidemic in Denmark, where detailed information was available for 3,938 cases, 15 per cent suffered from paralysis and 1.9 per cent died. This epidemic was remarkable for its high proportion of adult cases (over 15 years of age) which reached 33.2 per cent of the total, whilst the proportion had been less than 12 per cent before 1920 and amounted to 14.5 per cent from 1923 to 1925 and 24.9 per cent from 1928 to 1930. These figures are considerably higher than those recorded in other countries. The figures are given for the California epidemic of 1934, and it is pointed out that the seasonal distribution of the cases during this epidemic was not normal, the first rise in incidence occurring in May. The morbidity rate in Los Angeles, the principal focus of the epidemic, amounted by September 3rd to 73.3 per 100,000. During the year 1935 the centre of the epidemic moved towards the Atlantic States. The epidemic recorded in Virginia and North Carolina reached its maximum during the first week in August whereas the maximum for the more northerly states was reached at the beginning of September. In Australia the peaks in incidence occurred in February and May.

The second portion of the report reviews the newer knowledge of poliomyelitis. Poliomyelitis virus is comparatively resistant to antiseptics such as phenol, ether, acetone, gastro-intestinal secretions and concentrated sodium chloride. It has survived for 8 years in 50 per cent glycerol and for more than 100 days in tap water, and after drying for a month. On the other hand, the virus is inactivated by ultra-violet rays in less than three minutes and by oxidizing agents.

No experimental substitute has been found for the monkey. In this animal the virus attacks only the central nervous system and, if introduced into the nose, travels by definite nerve paths to the anterior horn cells of the cord.

Poliomyelitis immunity is very lasting, there being only 13 reported cases of second attacks. Evidence obtained by neutralization tests suggests that the majority of normal adults and children in towns are immune. It has been found that babies of immune mothers inherit maternal antibodies for the virus but these disappear within a few months. Poliomyelitis and immunity to that disease seem to be distributed all over the world and neutralization tests have revealed immunity in tropical countries such as Puerto Rico and inland Liberia, the latter country being inhabited by immune negroes who had had very little contact with Europeans. This finding stimulated

interest in finding outbreaks of clinical disease in tropical countries. As a result, epidemics were reported in Colombia, Brazil, and most of the countries of Africa. However, in spite of the world-wide immunity the clinical disease still shows the paradoxical contrast between the geographical and seasonal distribution, it being a disease of the warm season and of cold countries.

It is generally suggested that there are about 4 to 6 abortive cases (those with an acute febrile period lasting from 12 to 72 hours, slight rigidity of the neck and back, and frequently abnormal sensitiveness to pressure on the muscles of the limbs) to every paretic or paralytic case. Jensen has furnished results of titrations of the neutralizing power of sera of paralytic, non-paralytic, and abortive cases and the evidence suggests that the lower the ability of an individual to produce antibodies the more serious is the clinical form of the disease. Regarding the use of serum, it is shown that the sera highest in antibody titres are those from abortive rather than paralytic cases. Experimental results on serum prophylaxis are favourable but no convincing statistical proofs of its efficacy for man are available. No strictly controlled observations are available to decide the efficacy of neutralizing sera for treatment.

Yves Biraud and S. Deutschman, Epidemiol. Rep., League of Nations, 10-12, 1935.

The Prevention of Measles in an Urban Community

A statistical review of measles morbidity and mortality in children under 5 years of age in St. Etienne is reviewed for the years 1891 to 1934. Severe epidemics recurred at 3 year intervals. In 1933 an epidemic of measles attacked 70 soldiers with 7 deaths and soon the disease spread through the child population. In the first six months of 1934, nearly 3,000 cases were reported but the death rate was extraordinarily low. The death rate from measles and acute pulmonary disease at age 0-1 was 11.3 per 1,000, which was only one-third the average rate recorded in previous epidemics and even much below the rates in years of small and localized epidemics. At ages 1-5 the rate in 1934 was less than half that of previous epidemic years. The reduction in mortality is attributed to the activities of the Health Department early in the epidemic. The measures taken were prevention of children congregating together, especially at infant welfare clinics; advice to parents to prevent exposure of young children to susceptibles and exposure to cold; the exclusion from school of children with catarrhs; and the free use of convalescent serum obtained from the soldiers. Statistics are presented showing the success attending the use of serum.

R. Poulain, Rev. d'hyg., *57*: 561, 1935.

B. Aertrycke Food Poisoning through Mice Excreta

The possibility that rats or mice might be the source of infection in some outbreaks of food poisoning has been generally accepted since these rodents are frequently infected with salmonella organisms. However, the chain of evidence in such outbreaks is seldom complete as far as demonstration of the organism in rodents having access to the foodstuff. This outbreak of diarrhoea involving five members of one family was due to B. aertrycke. A mouse trapped in the home was found to be suffering from B. aertrycke infection and mouse faeces were found in a partly used tin of dried milk preparation which the first case, an eight months child, had been fed. From the pellets of mouse faeces B. aertrycke was isolated.

E. R. Jones and H. D. Wright, Lancet, No. 1, p. 22, 1936.